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North Carolina Department of Transportation
Statewide Planning Branch
Small Urban Planning Unit

Thoroughfare Plan

for

June, 1994

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Statewide Planning Branch
Small Urban Planning Unit

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Thoroughfare Plan

for the town of

CANTON

August 30, 1994

THOROUGHFARE PLAN

for

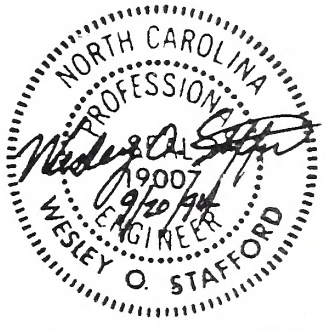
CANTON, NORTH CAROLINA

Prepared by the:

Statewide Planning Branch
Division of Highways
N. C. Department of Transportation

In Cooperation with:

The Town of Canton
The Federal Highway Administration
U. S. Department of Transportation



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ACKNOWLEDGMENTS

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I. INTRODUCTION

The economic growth of a region is largely dependent on the efficiency of its transportation system. Unless people and goods can move from one place to another quickly and conveniently, the area stagnates and fails to reach its full potential. Therefore, it is essential to develop a thoroughfare system that can efficiently handle present and future traffic needs. This report proposes such a system for the Town of Canton.

The first thoroughfare plan for Canton was produced by the Department of Transportation in 1976. This plan was then adopted by the town on November 12, 1976. After the adoption of the original plan a revision was made in 1982 and an updated thoroughfare plan was adopted by the town on February 26, 1985. The updated thoroughfare plan reflected the changes in Canton's population growth, economic development, and land use patterns since the completion of the last thoroughfare plan. Because there is constant growth and change, the North Carolina Department of Transportation conducted a review of the town and the adopted plan in April, 1992. After completing this review the engineer recommended that the Canton Thoroughfare Plan be updated. On August 11, 1992, the Town of Canton officially requested an update of their 1985 adopted thoroughfare plan. This report will document the updates to the population, employment, and traffic volumes within the Canton Planning Area. It will also document any changes to the recommended Thoroughfare Plan.

Canton is located in Haywood County, in the western mountains of North Carolina. It was originally known as Pigeon River or Pigeon Ford because of its proximity to the natural ford of the Pigeon River. Transportation has played a key role in Canton's evolution. The natural ford funnelled travelers through the area as early as 1803 when Locust Field Baptist Church was organized. In 1856 the construction of the Western Turnpike, a road from Asheville to the Tennessee state line, was completed. By 1881 the Western North Carolina Railroad had reached Canton. In 1895 the town was renamed to Canton after the northern city of Canton, Ohio. The name was suggested after the town erected a wrought iron bridge (manufactured in Canton, Ohio) across the Pigeon River. In 1906 Champion Fibre Company began construction of a pulp and paper mill in Canton. Champion brought in new jobs and dramatic growth which peaked around 1930. Since then Champion's influence has been one of relative stability.

Canton is located 14 miles west of Asheville, 11 miles east of the Waynesville, and 34 miles southeast of the North Carolina / Tennessee State line. The major highways serving the Canton Planning area are: Interstate 40, US 19/23/74,

NC 110, and NC 215. Rail service is provided by Norfolk Southern Railway. These primary highways and the rail system furnish Canton's transportation needs.

The purpose of this report is to present a thoroughfare plan for the Town of Canton that will address the area's projected traffic and land development needs for the next twenty years. It defines a functional system of roadways and recommends physical improvements including new road construction and pavement widening. In order for this plan to be of use, the community must coordinate approval of future land development with the thoroughfare plan.

Growth trends in the population, economy, land use, and traffic for the past twenty years were analyzed to project the area's growth to the year 2020. The forecasted traffic volumes and travel patterns determined the extent and type of transportation facilities included in this report.

Lastly, it should be emphasized that the proposed thoroughfare plan is based on the anticipated growth of the Town of Canton and its surrounding area as described in this report. It is possible that the actual growth patterns differ somewhat from those logically anticipated. As a result, it may be necessary to accelerate or retard the implementation of some portions of the plan and/or make revisions which will accommodate unexpected changes in urban development.

Geographic Location

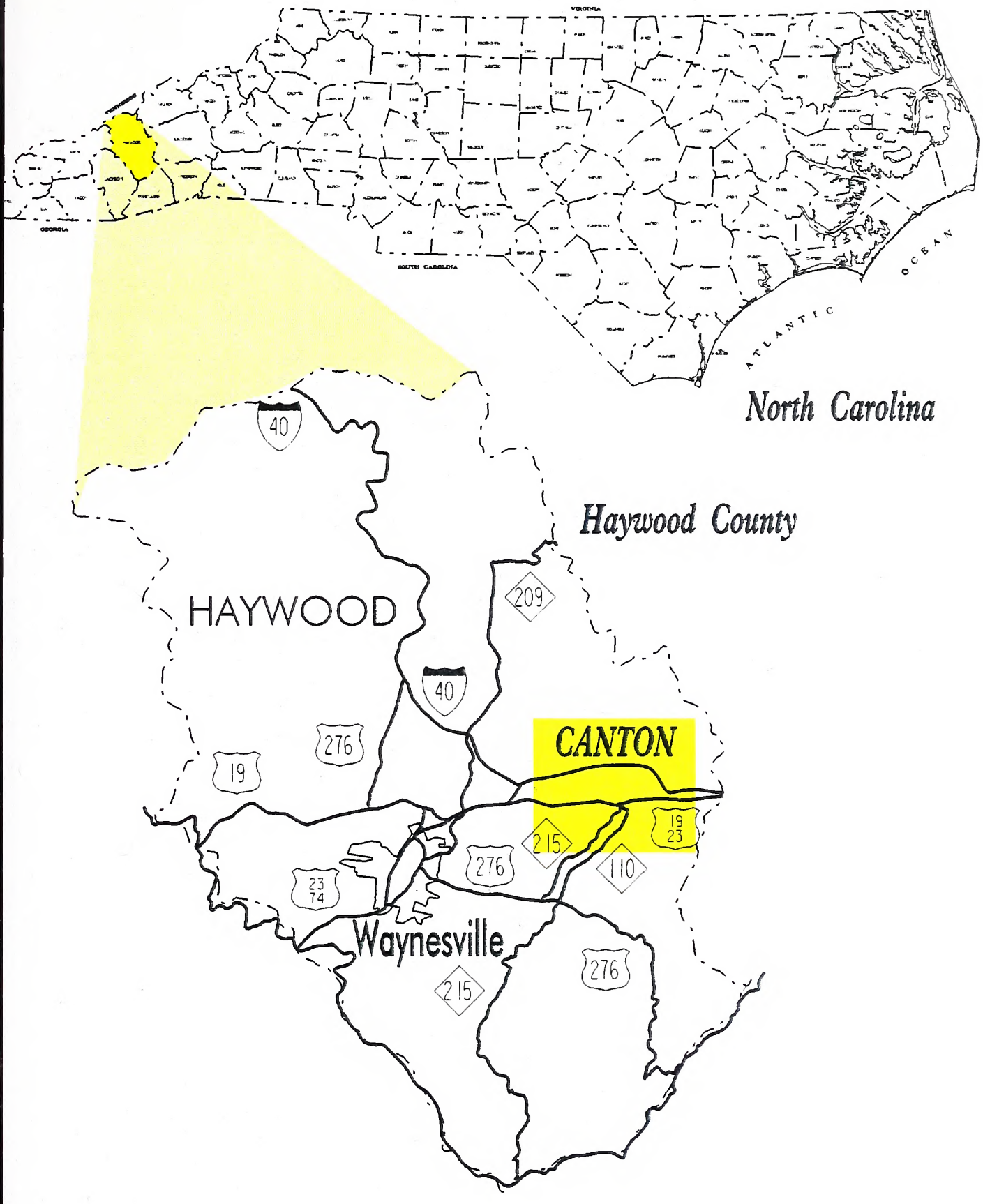


Figure 1

II. THOROUGHFARE PLANNING PRINCIPLES

Objectives

Typically, the urban street system occupies 25 to 30 percent of the total developed land in an urban area. Since the system is permanent and expensive to build and maintain, care and foresight are needed in its development. Thoroughfare planning is the process public officials use to assure the development of the most appropriate street system to meet the existing and future travel desires within the urban area.

The primary aim of a thoroughfare plan is to guide the development of the urban street system in a manner consistent with changing traffic demands. Through proper planning for street development, costly errors and needless expense can be averted. A thoroughfare plan will enable street improvements to be made as traffic demands increase, and help eliminate unnecessary improvements. By developing the urban street system to keep pace with increasing traffic demands, a maximum utilization of the system can be attained that will require a minimum amount of land for street purposes. In addition to providing for traffic needs, the thoroughfare plan should embody those details of good urban planning necessary to present a pleasing and efficient urban community. The location of present and future population, commercial enterprises, and industry affects major street and highway locations. Conversely, the location of major streets and highways within the urban area will influence the urban development pattern.

Other objectives of a thoroughfare plan include:

(1) To provide for the orderly development of an adequate major street system as land development occurs;

(2) To reduce travel and transportation costs;

(3) To reduce the cost of major street improvements to the public through the coordination of a street system with private action;

(4) To enable private interests to plan their actions, improvements, and development with full knowledge of public intent;

(5) To minimize disruption and displacement of people and businesses through long range advance planning for major street improvements;

(6) To reduce environmental impacts such as air pollution, resulting from transportation;

(7) To increase travel safety.

Thoroughfare planning objectives are achieved through both: (1) improving the operational efficiency of thoroughfares; and (2) improving the system efficiency through system coordination and layout.

Operational Efficiency

A street's operational efficiency is improved by increasing the capability of the street to carry vehicular traffic and people. In terms of vehicular traffic, a street's capacity is defined as the maximum number of vehicles which can pass a given point on a roadway during a given time period under prevailing roadway and traffic conditions. Capacity is affected by the physical features of the roadway, nature of traffic, and weather.

Physical ways to improve vehicular capacity include **street widening, intersection improvements, improving vertical** and **horizontal alignment**, and **eliminating roadside obstacles**. For example, widening a street from two to four travel lanes more than doubles the capacity of the street by providing additional maneuverability for traffic. Impedances to traffic flow caused by slow moving or turning vehicles and adverse effects of horizontal and vertical alignments are thus reduced.

Operational ways to improve street capacity include:

(1) **Control of access** - A roadway with complete access control can often carry three times the traffic handled by a non-controlled access street with identical lane widths and number of lanes.

(2) **Parking removal** - Increases capacity by providing additional street width for traffic flow and reducing friction to flow caused by parking and unparking vehicles.

(3) **One-way operation** - The capacity of a street can sometimes be increased 20-50%, depending upon turning movements and overall street width, by initiating one-way traffic operations. One-way streets can also improve traffic flow by decreasing potential traffic conflicts and simplifying traffic signal coordination.

(4) **Reversible lanes** - Reversible traffic lanes may be used to increase street capacity in situations where heavy directional flows occur during peak periods.

(5) **Signal phasing and coordination** - Uncoordinated signals and poor signal phasing restrict traffic flow by creating excessive stop-and-go operation.

Altering travel demand is a third way to improve the efficiency of existing streets. Travel demand can be reduced or altered in the following ways:

(1) Encourage people to form **carpools** and **vanpools** for journeys to work and other trip purposes. This reduces the number of vehicles on the roadway and raises the people carrying capability of the street system.

(2) Encourage the use of alternate modes of travel such as **transit**, **bicycles**, and **walking**.

(3) Encourage industries, business, and institutions to **stagger work hours** or establish variable work hours for employees. This will reduce travel demand in peak periods and spread peak travel over a longer time period.

(4) Plan and encourage **land use development** or redevelopment in a more travel efficient manner.

System Efficiency

Another means of altering travel demand is the development of a more efficient system of streets that will better serve travel desires. A more efficient system can reduce travel distances, time, and cost. Improvements in system efficiency can be achieved through the concept of functional classification of streets and development of a coordinated major street system.

Functional Classification

Streets perform two primary functions -- traffic service and land access -- which when combined, are basically incompatible. The conflict is not serious if both traffic and land service demands are low. However, when traffic volumes are high, conflicts created by uncontrolled and intensely used abutting property lead to intolerable traffic flow friction and congestion.

The underlying concept of the thoroughfare plan is that it provides a functional system of streets which permits travel from origins to destinations with directness, ease and safety. Different streets in this system are designed and called on to perform specific functions, thus minimizing the traffic and land service conflict. Streets are categorized as to whether they function as local access streets, minor thoroughfares or major thoroughfares (**see Figure 2**).

Local access streets provide access to abutting property. They are not intended to carry heavy volumes of traffic and should be located such that only traffic with origins and destinations on the streets would be served. Local streets may be further classified as either residential, commercial and/or industrial depending upon the type of land use which they serve.

Minor thoroughfares are more important streets in the city system. They collect traffic form local access streets and carry it to the major thoroughfare system. They may in some instances supplement the major thoroughfare system by facilitating minor through traffic movements. A third function which may be performed is that of providing access to abutting property. They should be designed to serve limited areas so that their development as major thoroughfares will be prevented.

Major thoroughfares are the primary traffic arteries of the city. Their function is to move intra-city and inter-city traffic. The streets which comprise the major thoroughfare system may also serve abutting property; however, THEIR MAJOR FUNCTION IS TO CARRY TRAFFIC. They should not be bordered by uncontrolled strip development because such development significantly lowers the capacity of the thoroughfare to carry traffic and each driveway is a danger and an impediment to traffic flow. Major thoroughfares may range from a two-lane street carrying minor traffic volumes to major expressways with four or more traffic lanes. Parking normally should not be permitted on major thoroughfares.

Idealized Major Thoroughfare System

A coordinated system of major thoroughfares forms the basic framework of the urban street system. A major thoroughfare system which is most adaptable to desire lines of travel within an urban area and which permits movement between various areas of the city with maximum directness is the radial-loop system. This system consists of several functional elements: radial streets, crosstown streets, loop system streets, and bypasses **(Figure 2)**.

Radial streets provide for traffic movement between points located in the outskirts of the city and the central area. This is a major traffic movement in most cities, and the economic strength of the central business district depends upon the adequacy of this type of thoroughfare.

IDEALIZED THOROUGHFARE PLAN

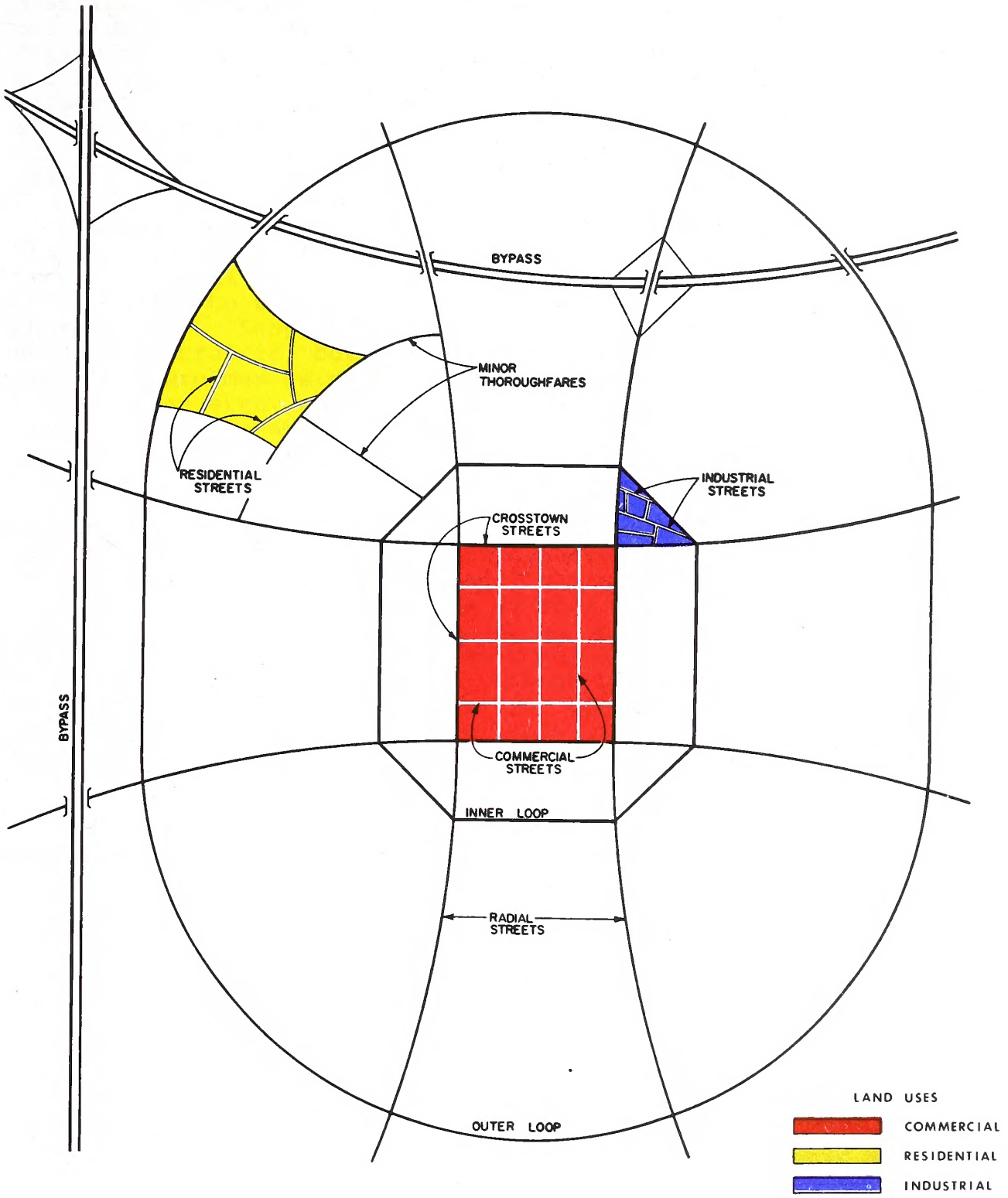


FIGURE 2

If all radial streets crossed in the central area, an intolerable congestion problem would result. To avoid this problem, it is very important to have a system of **crosstown streets** which form a loop around the central business district. This system allows traffic moving from origins on one side of the central area to destinations on the other to follow the area's border and allows central area traffic to circle and then enter the area near a given destination. The effect of a good crosstown system is to free the central area of crosstown traffic, thus permitting the central area to function more adequately in its role as a pedestrian shopping area.

Loop system streets move traffic between suburban areas of the city. Although a loop may completely encircle the city, a typical trip may be from an origin near a radial thoroughfare to a destination near another radial thoroughfare. Loop streets do not necessarily carry heavy volumes of traffic, but they function to relieve central areas. There may be one or more loops, depending on the size of the urban area, and they are generally spaced one-half mile to one mile apart, depending on the intensity of the land use.

A **bypass** is designed to carry traffic through or around the urban area, thus providing relief to the city street system by removing from it traffic which has no desire to be in the city. Bypasses are usually designed to through highway standards, with control of access. Occasionally, a bypass with low traffic volume can be designed to function as a portion of an urban loop. The general effect of bypasses is to expedite the movement of through traffic and to improve traffic conditions within the city. By freeing the local streets for use by shopping and home-to-work traffic, bypasses tend to increase the economic vitality of the local area.

Application of Thoroughfare Planning Principles

The concepts presented in the discussion of operational efficiency, system efficiency, functional classification, and the idealized major thoroughfare system are the conceptual tools available to the transportation planner in developing a thoroughfare plan. In actual practice, thoroughfare planning is done for established urban areas and is constrained by existing land use and street patterns, existing public attitudes and goals, and current expectations of future land use. Compromises must be made because of these and the many other factors that affect major street locations.

Throughout the thoroughfare planning process it is necessary from a practical viewpoint that certain basic principles be followed as closely as possible. These principles are as follows:

(1) The plan should be derived from a thorough knowledge of today's travel - its component parts, as well as the factors that contribute to it, limit it, and modify it.

(2) Traffic demands must be sufficient to warrant the designation and development of each major street. The thoroughfare plan should be designed to accommodate a large portion of all major traffic movements on relatively few streets.

(3) The plan should conform to and provide for the land development plan of the area.

(4) Certain considerations must be given to urban development beyond the current planning period. Particularly in outlying or sparsely developed areas which have development potential, it is necessary to designate thoroughfares on a long-range planning basis to protect rights-of-way for future thoroughfare development.

(5) While being consistent with the above principles and realistic in terms of travel trends, the plan must be economically feasible.

III. EXISTING AND PROJECTED CONDITIONS

Factors Affecting Transportation

Thoroughfare planning is a process whose objective is to develop a transportation system which will enable people and goods to travel safely and economically. To determine the needs of an area; its population, land use, and traffic must be examined. To make these determinations, it is important to understand and describe the type and volume of travel which takes place in the area, and also to clearly identify the goals and objectives to be met by the transportation plan.

In order to fulfill the objectives of an adequate twenty year thoroughfare plan, reliable forecasts of future travel patterns must be achieved. Such forecasts are possible only when the following major items are carefully analyzed: **(1)** significant trends in the economy; **(2)** historic and potential population changes; **(3)** character and intensity of land development; and **(4)** ability of the existing transportation system to meet existing and future travel demand. Additional items that vary in influence include the effects of legal controls such as zoning ordinances and subdivision regulations, availability of public utilities and transportation facilities, and topographic and other physical features of the urban area.

Economy and Employment

Canton's economy is greatly influenced by it's largest employer, Champion International. Located down town it is surrounded by NC 215, Fiberville Rd., and the Central Business District (CBD) of Canton. Champion's Canton plant employs approximately 1000 people. Presently, it is undergoing a major modernization that will ensure it's presence in Canton for the years to come.

Other important employers in the planning area are: American Silk Label, Canton Hardwood Co., Coast Lamp Manufacturing, and Patti Boo. Also there are various business establishments located: in the Central Business District, along US 19/23 West of Canton, along NC 215 and at the interchange of I-40 and NC 215.

Population Trends

Travel is directly related to population. The volume of traffic on any road is a direct result of the size and distribution of the area's population. The population growth has been slow in recent years for the Town of Canton and Haywood County. Beaverdam Township has also followed this trend of slow growth. **Table 1** shows the past and projected population figures for Canton and its vicinity.

TABLE 1

POPULATION TRENDS AND PROJECTIONS					
YEAR	1960	1970	1980	1990	2020
Haywood Co.	39,711	41,710	46,495	46,942	55,245
Beaverdam Township	11,969	11,468	11,997	10,397	12,237
Canton Planning Area	7,780	7,454	7,798	6,758	8,000

NOTE: The 1990 planning area population is estimated to be 65% of the Township. Population data obtained from Office of State Planning.

Land Use

The generation of traffic on a particular street is closely related to the adjacent land use. Attraction between different land uses varies with the intensity and spacing of the uses. Thus, for the purpose of transportation planning, it is necessary to designate land use by type. An analysis of the distribution of existing land uses serves as a basis for forecasting future land use needs and the resulting travel patterns.

For thoroughfare planning purposes, land use is grouped into four broad categories: **(1) Residential** - all land devoted to the housing of people, with the exception of hotels and motels; **(2) Commercial** - all land devoted to retail trade, including consumer and business services and offices; **(3) Industrial** - all land devoted to manufacturing, storage, warehousing, and transportation of products; and **(4) Public** - all land devoted to social, religious, educational, cultural, and political activities.

The land use in the Canton Planning Area has remained relatively stable over the past decade. The most heavily populated residential areas are: northeast of the Central Business District (CBD) along North Main Street and Newfound Road; to the southeast of the CBD between US 19/23/74 and NC 110; and, to the west of town in West Canton. Areas that indicate the potential for future residential growth are: north of Canton along Newfound Street, and to the south and southeast of Canton along NC 110 and between NC 110 and US 19/23/74.

The commercial development in Canton is concentrated in the CBD and along US 19/23/74 west of Canton and along NC 215 between US 19/23/74 and Interstate 40. Future commercial development is anticipated to continue in these locations as well as along the US 19/23/74 corridor east of Canton. Some new commercial development is also anticipated in the vicinity of the Newfound Street interchange with Interstate 40.

The industrial base is concentrated downtown at the Champion International plant. Other areas of industrial employment are on NC 215 near the interchange with Interstate 40 and along Beaverdam Road. This last area and the area between Beaverdam Road and Newfound Street has also been designated as a potential location for a new Industrial Park.

Public land in Canton is concentrated in the CBD. There is also some park land along NC 215 south of US 19/23/74. The Canton High School and the Canton Elementary School are also located in this area. The Canton Middle School is to the southeast of the CBD between NC 110 and US 19/23/74. The usage of public land is expected to remain relatively constant through the design year.

Existing Highway System

Currently, Canton is served by Interstate 40, US 19/23/74, NC 215 and NC 110. Interstate 40 is a 4-lane divided highway that runs east-west through Canton. Currently, a new interchange at Newfound Road is under construction. It is scheduled to be completed in 1994.

US 19/23/74 is a 3-lane to 4-lane facility that runs through Canton's Central Business District. This facility becomes a one-way pair from Main Street to Reed Street. The Westbound section is a 3-lane roadway with parking on one side from Main Street to Sorrells Street. From Sorrels Street to Reed Street it is 2-lanes with parking on one side. The Eastbound section is a 2-lane roadway from Reed Street to Main Street with parking on one side from Pisgah Drive to Main Street. From Reed Street to the west, US 19/23/74 is a

5-lane urban roadway which transitions into a 4-lane divided highway after leaving the Canton City Limits. Currently, the Transportation Improvement Program (T.I.P.) only lists deck rehabilitation for the Pigeon River Bridge on the eastbound section of US 19/23/74 known as Main Street.

NC 215 is a north-south thoroughfare that begins at its intersection with I-40 and moves southward through Canton following the western banks of the Pigeon river. This facility has recently been widened to a 5-lane facility from I-40 to SR 1585 and to a 4-lane facility from SR 1585 to US 19/23/74. The remainder of NC 215 is a 2-lane roadway.

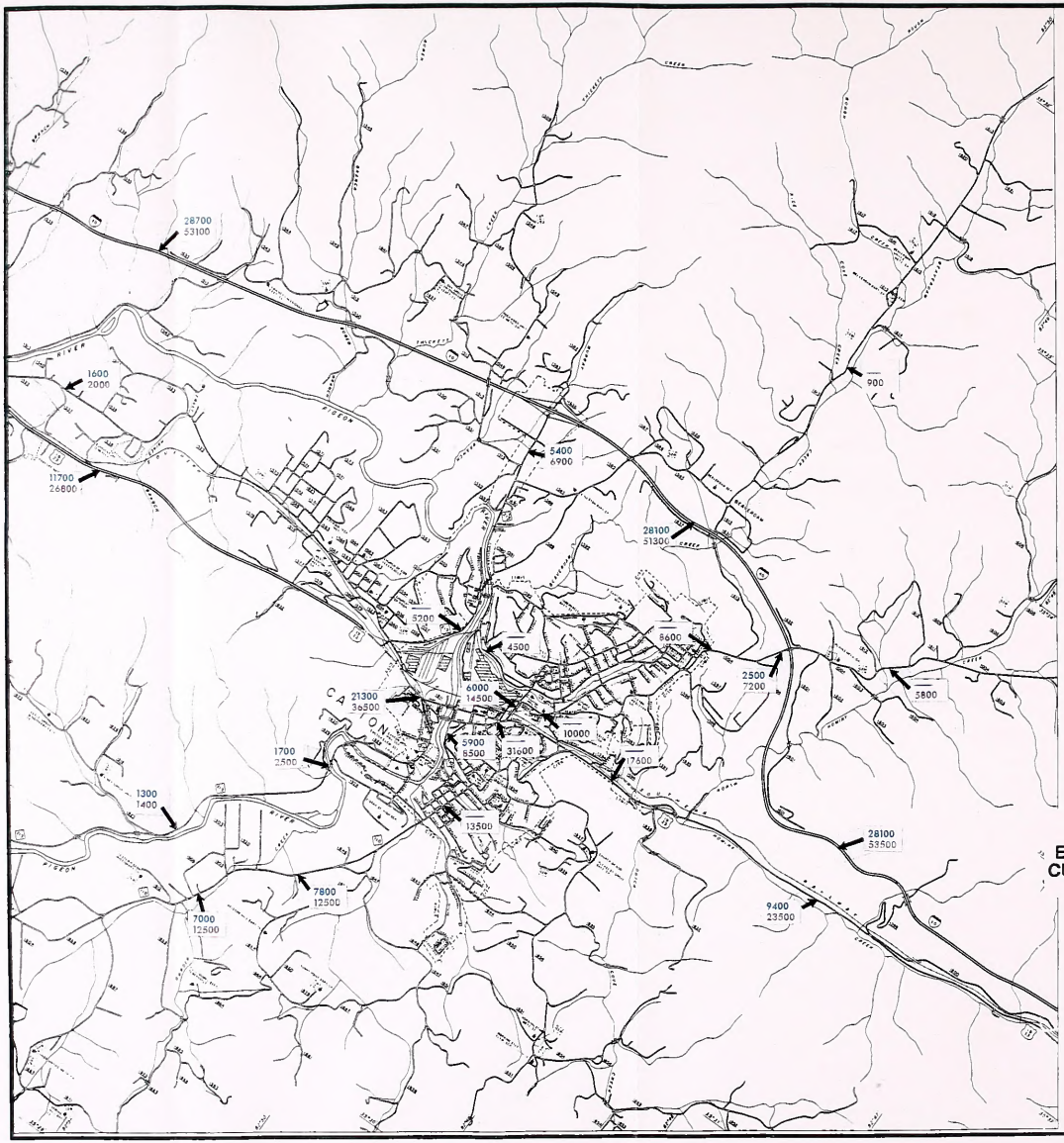
NC 110 is also a north-south thoroughfare. It begins at the intersection of Sorrells St. with Park St. and it moves Southward out of the Planning Area. NC 110 is a 2-lane facility and it is not currently listed in the T.I.P. for improvements.

The existing system is shown with current and projected traffic in **figure 3**.

Traffic Accidents

Accident records for January 1989 through December 1991 were studied for the Canton planning area in an attempt to identify High Accident Locations. A High Accident Location is generally defined as an intersection with 10 or more accidents within 3 years. During this time period there were eight locations with 5 or more accidents. These locations are shown in **figure 4**.

The location with the highest number of accidents was the intersection of US 19/23/74 and Harkin Cove Road (SR 1577). This intersection had 9 accidents. Upon examining this area closer 7 additional turning accidents were discovered within 60 m (200 ft) of the intersection. Three of these accidents occurred at the intersection of US 19/23/74 and the entrance to the Bi-Lo parking lot; and, four occurred at the intersection of US 19/23/74 and the entrance to the Canton Plaza. These kind of left turning and angle accidents tend to be the most dangerous. Adding a raised concrete median to US 19/23/74 to eliminate left turns except at the signal will help this situation.



LEGEND

1991 ADT
2020 ADT

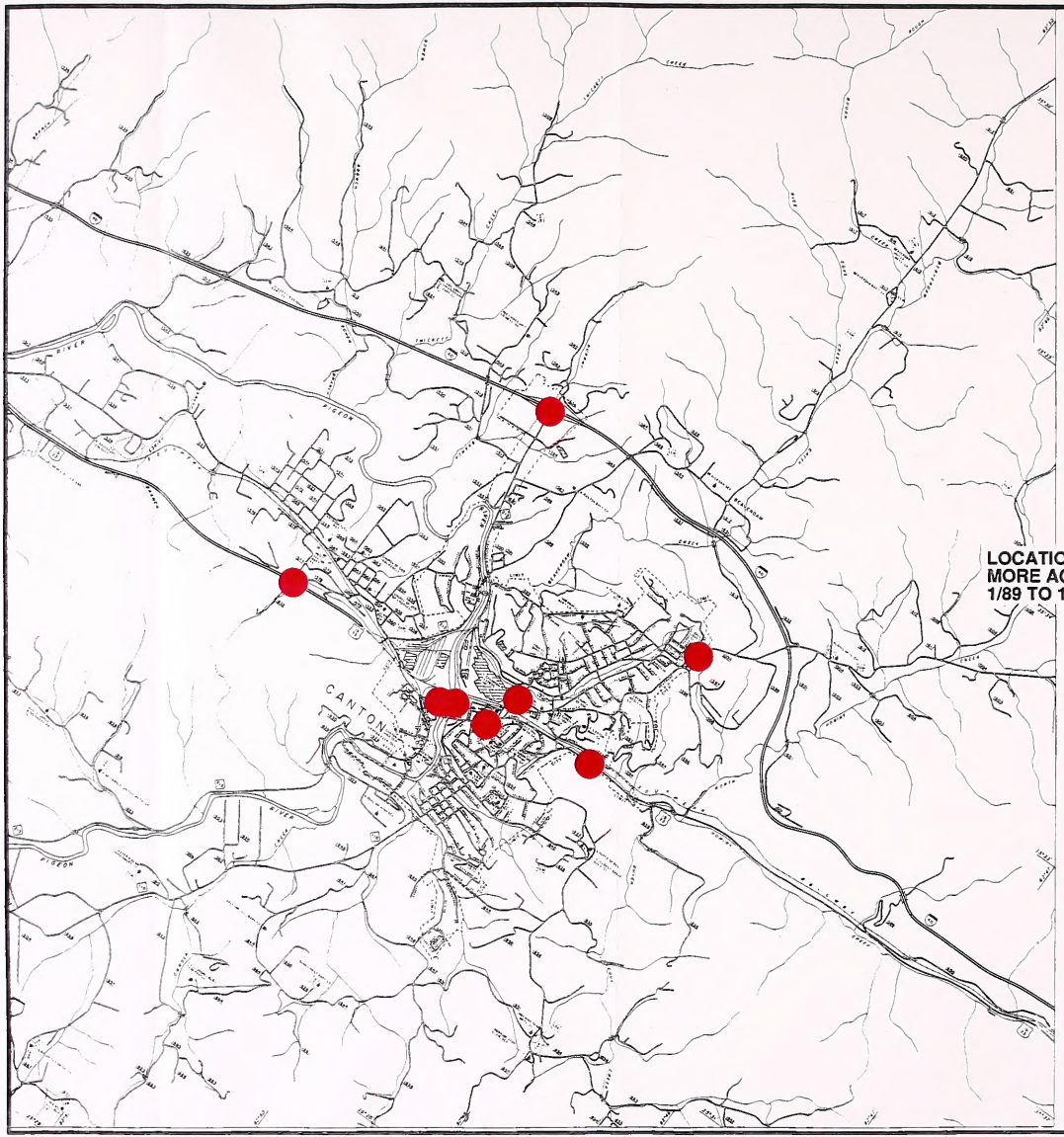
1991
2020

FIGURE 3

EXISTING NETWORK WITH CURRENT AND PROJECTED TRAFFIC

CANTON

AND VICINITY



LEGEND

LOCATIONS WITH 5 OR MORE ACCIDENTS BETWEEN 1/89 TO 12/91

FIGURE 4

HIGH ACCIDENT LOCATIONS

CANTON

AND VICINITY

IV. SYSTEM DEFICIENCIES

Deficiencies in a road system are evidenced by poor levels of service, high accident locations, and a difficulty in traveling from an origin to a particular destination. These deficiencies include highway sections where either the lane widths do not meet state standards, the bridges are functionally obsolete and structurally deficient, or the accident frequency is excessive.

Capacity Analysis

Capacity is defined as the maximum number of vehicles, under prevailing roadway and traffic conditions, that have a reasonable expectation of passing over a given roadway section in one or both directions during a given time period. A comparison of capacity with actual traffic volumes is a good indicator of the adequacy of the existing major street network.

An analysis of roads in Canton was made to determine if the projected traffic (year 2020) would exceed the practical capacity of the system. Based on this analysis the following roads are expected to approach or exceed their practical capacity within the design period:

US 19/23/74 will exceed its capacity along the current 3-lane section in Buncombe County to the beginning of the one-way pair in Canton.

Bridge Street (SR 1643) will exceed its capacity from the intersection with Church Street to the intersection with North Main Street and Fiberville Road.

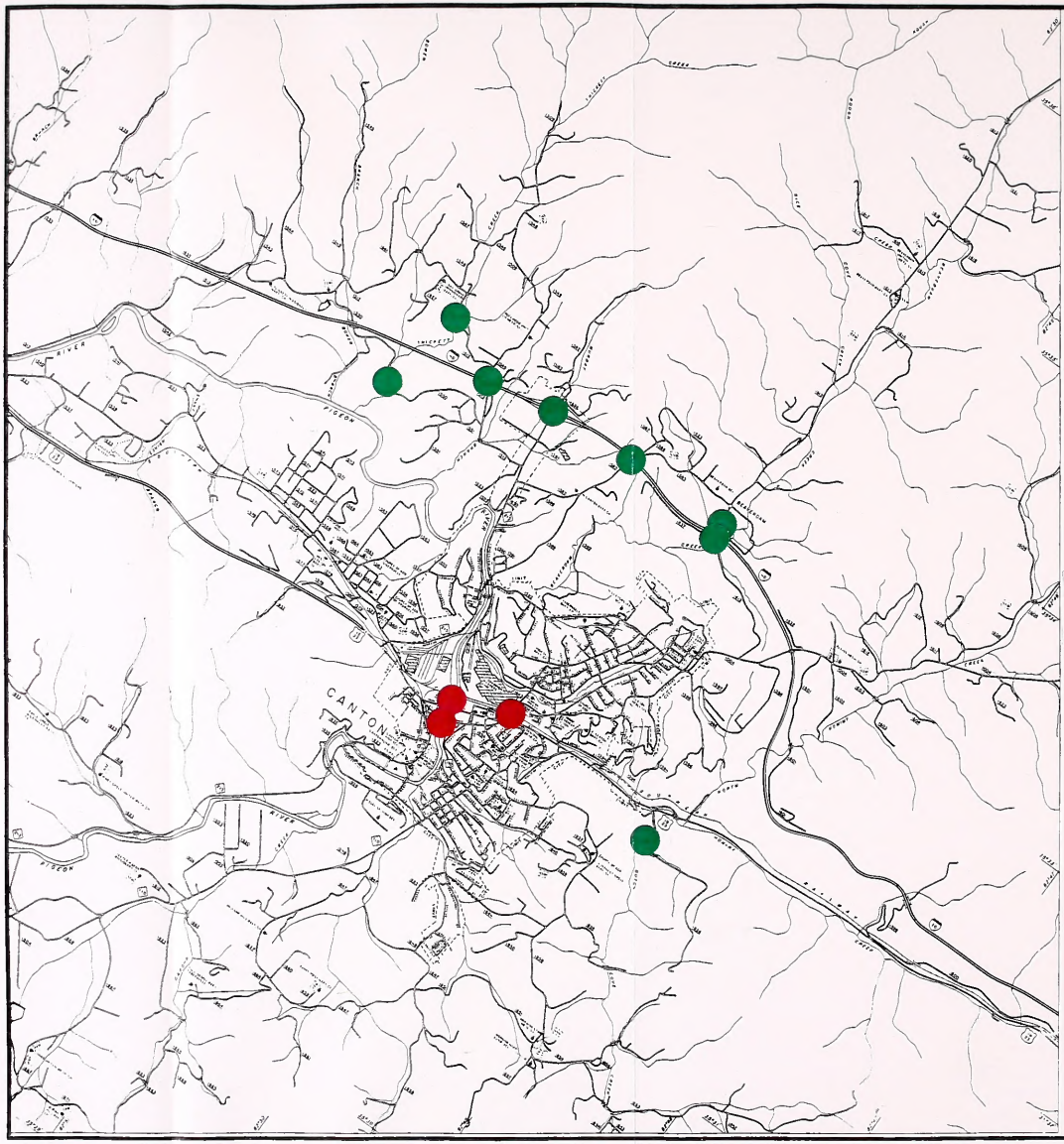
NC 110 will approach its' capacity from the Planning Area Boundary to its' intersection with Locust Street.

There are also deficiencies in the continuity of Canton's major street system. System continuity is the ability to travel between different sections of the planning area in a direct and efficient manner. In Canton there is a need for a facility that will connect East US 19/23/74 to NC 110 south of Canton. Currently traffic is using narrow residential streets to meet this need. These streets are Smathers Street, Spring Street, and Locust Street. There is also a need for a facility to connect NC 110, over the Pigeon River to NC 215 south of Canton.

Lane widths and Functionally Obsolete or Deficient Bridges also influence the capacity of a street network. The minimum tolerable lane widths for two lane roads are shown in **Table 2**. Facilities in Canton which do not meet these minimum lane widths are discussed in Chapter V. The functionally obsolete and structurally deficient bridges in the Canton Planning Area are shown in **figure 5**.

Table 2

Minimum Tolerable Lane Widths						
Average Daily Traffic (ADT)	Principal Arterials		Minor Arterials		Collectors	
	m	ft	m	ft	m	ft
Over 2000	3.3	11	3.3	11	3.3	11
400 - 2000	-	-	3.0	10	3.0	10
100 - 400	-	-	3.0	10	2.7	9
Below 100	-	-	-	-	2.7	9



LEGEND

STRUCTURALLY DEFICIENT

FUNCTIONALLY OBSOLETE

FIGURE 5

FUNCTIONALLY OBSOLETE AND STRUCTURALLY DEFICIENT BRIDGES

CANTON

AND VICINITY

Level of Service

In an urban area, a street's ability to move traffic is generally controlled by the spacing of major intersections, the pavement width, and the type and number of traffic control devices. These characteristics can be manipulated to increase the capacity and improve the level of service.

The level of service is a function of the ease of movement experienced by motorists using the facility. Six levels of service, shown in **Figure 6**, have been selected to identify the conditions existing under various speed and volume conditions on any highway or street. The six levels of service are:

1. **Level of service A** - A condition of free flow with low traffic volumes and high speeds. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. The general level of comfort and convenience provided to the motorist, passenger, or pedestrian is excellent.

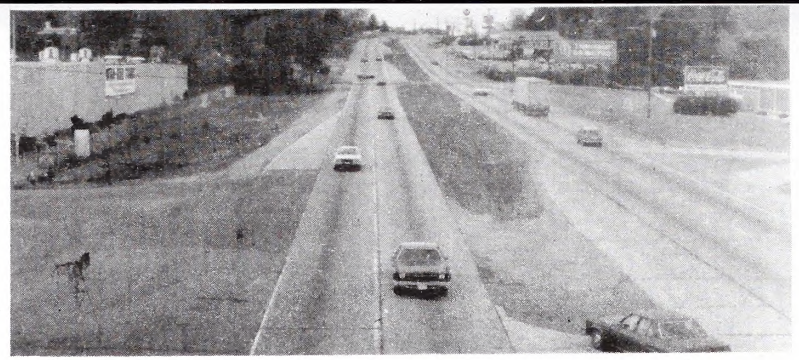
2. **Level of service B** - A zone of stable flow, where the presence of other users in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver within the traffic stream from LOS A, because the presence of others in the traffic stream begins to affect individual behavior.

3. **Level of service C** - Also in the range of stable flow, but the operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by the presence of others, and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.

4. **Level of service D** - Approaches unstable flow, where speed and freedom to maneuver are severely restricted. The driver or pedestrian experiences a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.

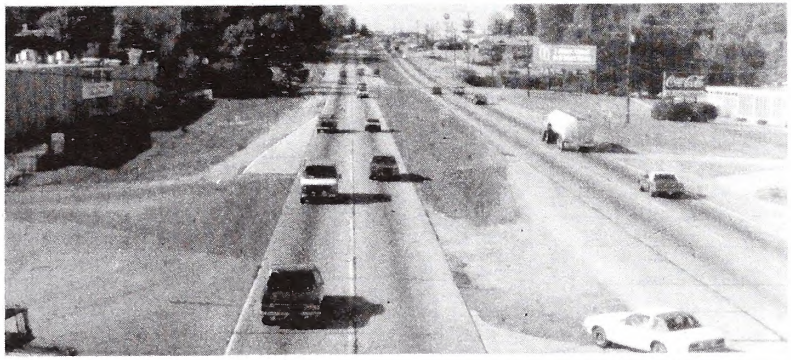
5. **Level of service E** - Represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Maneuvering within the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to "give way" to accommodate such maneuvers. Comfort and convenience levels are extremely poor. Driver and pedestrian frustration is generally high. Operations at this level are usually unstable because small increases in flow or minor perturbations within the traffic stream will cause breakdowns.

6. **Level of service F** - Forced flow operations at low speeds, where volumes are below capacity. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop-and-go waves, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Level-of-service F is used to describe the operating conditions within the queue, as well as the point of the breakdown. In many cases, operating conditions of vehicles or pedestrians discharged from the queue may be quite good. It is the point at which arrival flow exceeds discharge flow which causes the queue to form. Level-of-service F is an appropriate designation for such points.



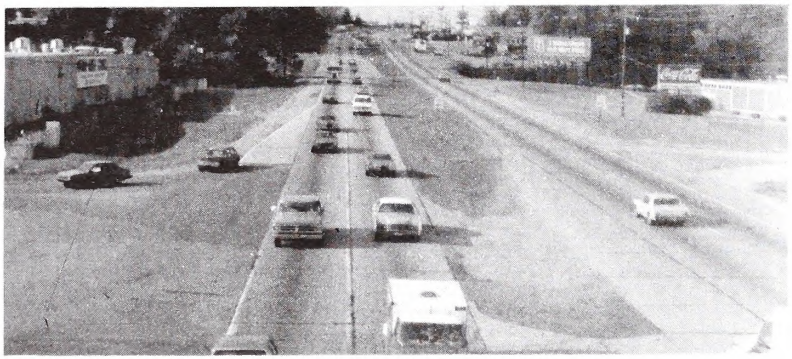
LEVEL OF SERVICE - A

LEVEL OF SERVICE - D

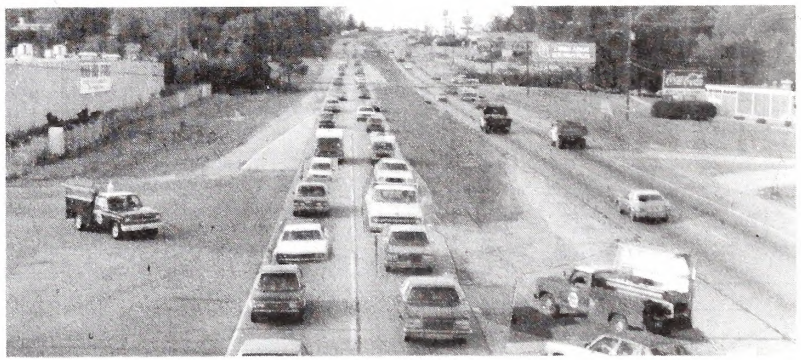


LEVEL OF SERVICE - B

LEVEL OF SERVICE - E



LEVEL OF SERVICE - C



LEVEL OF SERVICE - F

LEVELS OF SERVICE

FIGURE 6

V. Thoroughfare Plan

The thoroughfare plan is a representation of the existing highway system by functional use. These uses include major thoroughfares, minor thoroughfares, and local access streets. A thoroughfare plan study uncovers the need for new facilities, and it identifies existing and future deficiencies in the transportation system.

This chapter discusses the thoroughfares classified as a major or minor thoroughfare inside the Canton Planning Area. Specific recommendations that will improve the operational efficiency, facility safety, and system deficiencies are included in the discussions that follows. The adopted thoroughfare plan is shown on **figure 7**. Specific details on physical and operational characteristics of the facilities are listed in **Appendix B**.

Major Thoroughfares

Interstate 40 - This highway is the major carrier for east-west traffic. Presently it serves a high percentage of through trips and truck traffic. It is a 4-lane divided facility with full control of access and grade separations at all intersections. No improvements to this facility are necessary.

US 19/23/74 - This route parallels I-40 through the Planning Area and acts as the main artery into the Central Business District (CBD) of Canton. US 19/23/74 enters the Planning Area from the east as a 3-lane roadway. At Oak Street it becomes a 2-lane road until the intersection with Bridge Street. From Bridge Street to the intersection with Park Street and Main Street it is a 11.58 meter (38 foot) wide 4-lane roadway. US 19/23/74 then becomes a one-way pair system on Park Street (westbound) and Main Street (eastbound). The one-way pair ends and the name of the facility changes to Clyde Street at the intersection with southbound NC 215. From the intersection with Park & Main streets to Haines Branch it is a 5-lane roadway. At Haines Branch it changes to a 4-lane divided highway and leaves the Planning Area.

The section of US 19/23/74 to the east of Canton will be over capacity by the design year (2020). US 19/23/74 should be widened to a 5-lane facility from SR 1200, in Buncombe County, (East Canton exit from I-40) to the intersection with Main Street and Park Street. This widening will meet the future traffic demand on this facility.

NC 110 - NC 110 serves Canton from the south. It is a 2-lane roadway through the Planning Area. There are no recommendations for this facility.

NC 215 - A project to widen NC 215 to a 5-lane facility from I-40 to SR 1585 and to a 4-lane facility from SR 1585 to US 19/23/74 has been completed. The remainder of NC 215, from US 19/23/74 southward to US 276 is a narrow 2-lane roadway with poor horizontal alignment. The section of NC 215 from US 276 to the intersection with the NC 215 Connector should be widened to a minimum of 6.6 meters (22 feet) to improve functional design and enhance safety.

Newfound Road (SR 1004) - A new interchange with Interstate 40 is under construction. The interchange is scheduled to open in 1995. The section of Newfound Road from SR 1606 to Beaverdam Road should be widened to a minimum of 7.2 meters (24 feet) to improve functional design and enhance safety. The remaining section from Beaverdam Road to SR 1596 will be over capacity by the design year. Widening this section to a 7.2 meters (24 feet) will provide for the future traffic demand.

North Main Street (SR 1004) - This facility will not be over capacity by the design year. However, the new interchange on Newfound Road has the potential to generate more truck traffic along North Main Street. Currently, this facility is not adequately designed to accommodate truck traffic. To solve this problem the parking along North Main Street should be removed. It is also recommended that the section of North Main Street from the intersection with Newfound Street to the intersection with Trammell Avenue be realigned to accommodate truck traffic. This new section of roadway should be a 7.2 m (24 foot) 2-lane facility.

As a temporary measure it may be necessary to widen the existing curves to provide an adequate turning radius for trucks. This will ensure that trucks can stay in their travel lane at very slow speeds. This will improve the safety in the area until the new alignment project can be built.

Bridge Street (SR 1643) - Portions of this facility will be over capacity by the design year (2020). Widening this roadway to a 5-lane curb and gutter facility from US 19/23/74 to Fiberville Road will provide for the future traffic demand.

Fiberville Road (SR 1643) - This facility will not exceed it's capacity by the design year.

Thickety Road (SR 1513) - This facility should be widened to a minimum of 6.6 meters (22 feet) to enhance safety and to improve functional design.

SR 1523 - This road should be widened to a minimum of 6.6 meters (22 feet) to enhance safety and to improve functional design. Patton farm is located on SR 1523 and it is listed on the National Register of Historic Places. Before widening this facility the District Engineer should submit plans to the Survey and Planning Branch of the Historic Preservation Office for review.

Beaverdam School Road (SR 1585) - This facility should be widened to a minimum of 7.2 meters (24 feet) to enhance safety and improve functional design.

Beaverdam Road (SR 1613) - The facility should be realigned beginning 230 meters north of its intersection with Newfound Road. The new alignment will intersect with Newfound Road approximately 275 meters northeast of the existing Beaverdam Road / Newfound Road intersection. The new alignment should be a typical cross section type "L" (See Appendix A). The section of Beaverdam Road from its new alignment to the entrance of the proposed Beaverdam Industrial site north of SR 1640 should be widened to a minimum of 7.2 meters (24 feet) to improve safety and enhance functional design. The remainder of Beaverdam Road should be widened to a minimum of 6.6 meters (22 feet).

Southeastern Loop - This proposed facility will provide a 3-lane roadway on new location from US 19/23/74 to NC 110. This alignment will remove through traffic from the residential areas along Smathers Street, Spring Street, Academy Street, and Locust Street. It will also provide improved access to Southeastern Canton.

NC 215 Connector - This proposed facility will provide a 2-lane roadway on new location to connect NC 110 to NC 215 with a river crossing south of Canton. This facility will help alleviate traffic demand on NC 110 and the US 19/23/74 one-way pair system.

Minor Thoroughfares

Newfound Street - There are no recommendations for this facility.

Beaverdam Street (SR 1592) - Widen this facility to a minimum of 6.6 meters (22 feet) to improve functional design and enhance safety.

Thompson Street - There are no recommendations for this facility.

Cherry / Hill Streets - A new 2-lane section of roadway is recommended to connect Cherry Street to Hill Street. Also, Hill Street should be widened to 7.2 meters (24 feet) to improve functional design and enhance safety.

Dutch Cove Road (SR 1854) / Academy Street - The section of SR 1854 from SR 1835 to Spring Street should be widened to a minimum of 6.0 meters (20 feet) to improve functional design and enhance safety.

Rhoda Street - There are no recommendations for this facility.

Substation Road - There are no recommendations for this facility.

SR 1924 - There are no recommendations for this facility.

Pigeon Street - There are no recommendations for this facility.

FIGURE 7

LEGEND

EXISTING	PROPOSED	
———	▪▪▪▪▪	MAJOR THOROUGHFARE
———	- - - -	MINOR THOROUGHFARE
●	◉	INTERCHANGE
○	◌	GRADE SEPARATION

ADOPTED BY:

CANTON	APRIL 12, 1994
N.C. DEPT. OF TRANSPORTATION	JUNE 3, 1994
RECOMMENDED BY STATEWIDE PLANNING BRANCH	APRIL 22, 1994
PUBLIC HEARING DATE	APRIL 12, 1994

THOROUGHFARE PLAN

CANTON

AND VICINITY

FEB. 11, 1994

VI. Construction Priorities

Construction priorities will vary depending on what criteria are considered and what weight is attached to the various criteria. Most people agree that improvements to the major thoroughfare system and major traffic routes are more important than minor thoroughfares where traffic volumes are lower. To be in the State's Transportation Improvement Program, a Project must show favorable benefits relative to costs and should not be prohibitively disruptive to the environment.

Environmental Concerns

Environmental factors considered in highway project evaluation can be divided into three categories --physical, social/cultural, and economic. Factors from these categories are utilized in the benefits analysis. These primary environmental factors are shown in **table 3**. The relative environmental impact of a project is subjectively measured by summing the positive and negative impacts on various environmental factors.

The potential impact to historic sites in Canton is a concern that must be addressed. Currently, there are two sites within the Canton Planning Area that are listed on the National Register of Historic Places. The widening of SR 1523 to meet minimum tolerable lane width standards may have an impact on one of these sites. Patton farm is a National Register site located on SR 1523. Before widening this facility the District Engineer should submit plans to the Survey and Planning Branch of the Historic Preservation Office for review. The other National Register site (Old Main Post Office) is not affected by any recommendation. Other properties in the Canton area that may qualify as historic properties are negatively impacted by the following projects:

1) North Main Street realignment

2) US 19/23/74 widening in the vicinity of Bridge Street and Main Street

3) Bridge Street widening.

To reduce the potential impacts, a survey to identify historical sites along the limits of these projects is recommended. Also, an archaeological survey may be required along the Southeastern Loop and the NC 215 Connecter. It is not anticipated that the archaeological surveys will produce significant finds that would require relocating the projects.

The economic impact of a project is an estimate of the probability that the project will stimulate economic growth in the planning area. This probability is subjectively calculated based on knowledge of the project, local development characteristics, and land development potential. The probability of economic development is then rated on a scale of 0.00 (none) to 1.00 (excellent). **Table 4** contains the calculated environmental and economic impacts for each of the major projects.

Benefit / Cost Analysis

Benefits are determined based on cost savings to the network users. The total benefit is the sum of the savings in three categories. These categories are vehicle operating costs, travel time costs, and the cost of accidents. The reduction in each of these costs is the "project" benefits received by the users. The benefits produced by each project is then compared to the estimated cost of building the project. A benefit/cost analysis was preformed on the major projects in the Canton Thoroughfare Plan. These projects and their benefits are shown in **table 4**.

TABLE 3

Environmental Considerations		
Physical Environment	**Social and/or Cultural Environment**	**Economic Environment**
Air Quality	Housing	Businesses
Water Resources	Neighborhoods	Employment
Wildlife	Noise	Economic Development
Vegetation	Education Facilities	Public Utilities
	Churches	Transportation Costs
	Park and Recreational Facilities	Capital Costs
	Public Health and Safety	Operation and Maintenance Costs
	National Defense	
	Aesthetics	
	Historic Sites and Landmarks	

TABLE 4

Canton Thoroughfare Plan Cost Estimates - Benefits - and Probable Impacts

DESCRIPTION	CONST. COST	ROW 1 COST	TOTAL 1 COST	USER BENEFITS	ECONOMIC DEVELOPMENT	ENVIRONMENTAL IMPACTS POSITIVE	ENVIRONMENTAL IMPACTS NEGATIVE
New Location Projects							
NC 215 Connector	1,409	25	1,434	12,346	0.45	0.35	0.40
Southeastern Loop	10,047	312	10,359	17,110	0.60	0.65	0.25
North Main Street				N/A 2	0.51	0.30	0.65
Widening Projects							
US 19/23/74	14,184	416	14,600	51,739	0.45	0.30	0.35
Bridge Street	1,169	186	1,355	4,025	0.30	0.25	0.20

Notes - 1 Costs & Benefits are in Thousands of Dollars.
2 Benefits can not be calculated for this project.

VII. IMPLEMENTATION

There are several methods through which a local government may implement a Thoroughfare Plan. They are as follows:

State-Municipal Adoption of the Thoroughfare Plan

Both the Town of Canton and the North Carolina Department of Transportation have responsibility for implementation of the Canton Thoroughfare Plan. Chapter 136, Article 3A, Section 136-66.2 of the North Carolina General Statutes provides that after development of a thoroughfare plan, the plan may be adopted by the governing body of the municipality and the Board of Transportation as the basis for future street and highway improvements. After mutual adoption, negotiations will begin to determine which of the existing and proposed thoroughfares will be a Department of Transportation responsibility and which will be a municipal responsibility. Facilities which are designated as State responsibility will be constructed and maintained by the Division of Highways; however, the municipality may share in the right-of-way cost. This share of costs will be determined at the time of construction.

In general, the State is responsible for those facilities which will be serving major volumes of through traffic and traffic from outside the area to major commercial, industrial, and institutional areas inside the municipality. Those facilities which will serve primarily internal traffic are to be a municipal responsibility.

After adoption of the thoroughfare plan, a municipality has the legal authority provided by the General Statutes of North Carolina to protect existing and proposed highway corridors through subdivision regulations and the adoption of a Roadway Corridor Official Map. Zoning and development review will also play an important part in protecting and implementing the thoroughfare plan.

Subdivision Controls

Subdivision regulations require every subdivider to submit to the local planning commission a plan of his proposed subdivision and requires that the subdivision be constructed to certain standards. Through this process, it is possible to require the subdivision streets to conform to the Thoroughfare Plan and to reserve or protect necessary rights-of-way for projected roads and highways that are to become a part of the Thoroughfare Plan.

The construction of subdivision streets to adequate standards will reduce maintenance costs and ease the transfer of the streets to the State Highway System. **Appendices C & D** outline the recommended design standards.

Roadway Corridor Official Map

North Carolina General Statutes 136-44.50 through 133-44.53 are collectively designated as the "Roadway Corridor Official Map Act." For cities contemplating the adoption of a Roadway Corridor Map, more commonly referred to as an official street map, there several things to consider prior to implementation. First and foremost, it should be recognized that an official street map places severe, but temporary, restrictions on private property rights. These restrictions are in the form of a prohibition, for a period of up to three years, for the issuance of building permits or subdivision of property lying within an official street map corridor. This authority should be used carefully and only in cases where less restrictive powers will be ineffective.

The Statute establishing the Official Street Map authority is fairly explicit in outlining the procedures to be followed and the types of projects to be considered. As required by the Statute, a project being considered for an Official Street Map must be programed in the State's Transportation Improvement Program (TIP) or be included in a locally adopted capital improvement plan and appear on the adopted street system plan. The Statute states that the capital improvement plan must be for a period of ten years or less, and must identify the estimated cost of acquisition and construction of the proposed project as well as the anticipated financing.

The Program and Policy Branch of the North Carolina Department of Transportation is responsible for facilitating the adoption of Official Street Maps. Cities considering Official Street Map projects should contact this Branch for their "Guidelines for Municipalities Considering Adoption of Roadway Corridor Maps" at:

Programming and Policy Branch
NC Department of Transportation
P.O. Box 25201
Raleigh, NC 27611

Zoning

A zoning ordinance can be beneficial to thoroughfare planning in that planned locations of various land uses and planned densities of dwellings can be realized. This provides a degree of stability on which to make future traffic projections and to plan streets and highways.

Other benefits of a good zoning ordinance are: **(1)** the establishment of standards of development which will aid traffic operations on major thoroughfares, and **(2)** minimizing strip commercial development which creates traffic friction and increases traffic accidents.

Development Reviews

Driveway access to a State-maintained street or highway is reviewed by the District Engineer's office and by the Traffic Engineering Branch of the North Carolina Department of Transportation prior to access being allowed.

Any development expected to generate large volumes (i.e. shopping centers, fast food restaurants, large industries, etc.) may be comprehensively studied by staff from the Traffic Engineering, Planning and Research, and Roadway Design Branches of NC DOT. If done at an early stage, it is often possible to significantly improve the development's accessibility at minimal expense. Since the municipality is the first point of contact for developers, it is important that the municipality advise them of this review requirement and cooperate in the review process.

Urban Renewal

Urban renewal is defined as the rehabilitation of downtown areas by demolishing, remodeling, or repairing existing structures in accordance with comprehensive plans. This process allows for corrections to basic problems in the street system layout and design.

To qualify for community development funds or discretionary funds for urban renewal, a city must first prepare a community development program. Urban areas compete throughout the State on the bases of demographic points which consider such conditions as percent of substandard housing, people per square feet of housing, dwelling unit age, etc.

An effort can be made to ensure that community development and transportation plans are compatible.

Funding Sources

Capital Improvements Program

One of the tools which makes it easier to build a planned thoroughfare system is a capital improvements program. This is a long range plan for the spending of money on street improvements, acquisition of right-of-way, and other capital improvements within the limits of projected revenues. Municipal funds should be available for the following: **(1)** construction of street improvements which are a municipal responsibility, **(2)** right-of-way cost sharing on facilities designated as Division of Highways responsibility, and **(3)** the advance purchase of right-of-way where such action is required.

Transportation Improvement Program

North Carolina's Transportation Improvement Program (TIP) is a document that lists all major construction projects planned for the next seven years. Similar to a local Capital Improvement Program, the TIP matches projects with projected funding sources. Each year completed projects are removed, programed projects are advanced, and new projects are added as the TIP is updated. TIP funds are available for highway construction, highway widening, bridge replacements, highway safety projects, public transit projects, railroad projects, and bicycle projects.

The Town of Canton and other municipalities may request that projects be added to the TIP at annual TIP public hearings. A Board of Transportation member will review all of the project requests in his or her division. Based on the technical feasibility, need, and available funding, the board member will decided which projects should be included in the TIP.

Small Urban Funds

Small Urban funds are annual discretionary funds made available to municipalities with qualifying projects. The maximum amount is $300,000 per year per project. A town may have multiple projects. Requests for Small Urban Funds should be directed to the appropriate Board of Transportation member and Division Engineer.

Industrial Access Funds

If an Industry wishes to develop property that does not have access to a state maintained highway, and certain economic conditions are met, then funds may be made available for construction of an access road. These funds are not intended to build a driveway for an industry. The District Engineer should be contacted for more information or to request industrial access funds.

Other Funding Sources

1. Assess user impact fees to fund transportation projects. These fees, called "facility fees" in the legislation, are to be based upon "reasonable and uniform considerations of capital costs to be incurred by the town as a result of new construction. The facility fee must bear a direct relationship to additional or expanded public capital costs of the community service facilities to be rendered for the inhabitants, occupants of the new construction, or those associated with the development process."

2. Enact a bond issue to fund street improvements.

3. Continue to work with NCDOT to have local projects included in the Transportation Improvement Program (TIP).

4. Consider the possibility of specific projects qualifying for federal demonstration project funds.

5. Adopt a collector street plan that would assess buyer or property owners for street improvement.

6. Charge a special assessment for utilities; for example, increase water and sewer bills to cover cost of street improvements.

TABLE 5

FUNDING SOURCES & METHODS RECOMMENDED FOR IMPLEMENTATION OF PROJECTS

PROJECT	FUNDING SOURCES					METHODS OF IMPLEMENTATION				
	Local Funds	TIP Funds	Indust. Access	Small Urban	Secondary Roads	T-fare Plan	Subdiv. Ord.	Zoning Ord.	Future Street Lines	Development Review
MAJOR THOROUGHFARES										
NC 215 Connector		X				X	X	X	X	X
US 19/23/74 Widening		X				X		X	X	X
Bridge Street Widening		X				X		X	X	X
Southeastern Loop		X				X	X	X	X	X
North Main Street		X		X	X	X		X	X	X
Beaverdam Road (SR 1613)	X	X		X		X	X	X	X	X
MINOR THOROUGHFARES										
Cherry / Hill Street Connector	X					X	X	X	X	X

APPENDICES

APPENDIX A

TYPICAL THOROUGHFARE CROSS SECTIONS

Cross section requirements for thoroughfares vary according to the desired capacity and level of service to be provided. Universal standards in the design of thoroughfares are not practical. Each street section must be individually analyzed and its cross section requirements determined on the basis of the amount and type of projected traffic, the existing capacity, the desired level of service, and the available right-of-way.

Typical cross section recommendations are shown in **Figure 8**. These cross sections are typical for facilities on new location and where right-of-way constraints are not critical. For widening projects and urban projects with limited right-of-way, special cross sections should be developed that meet the needs of the project.

On all existing and proposed major thoroughfares delineated on the thoroughfare plan, adequate right-of-way should be protected or acquired for the ultimate cross sections. Ultimate desirable cross sections for each of the thoroughfares are listed in **Appendix B**. Recommendations for "ultimate" cross sections are provided for **(1)** thoroughfares which may require widening after the current planning period; **(2)** thoroughfares which are borderline adequate and accelerated traffic growth could render them deficient; and **(3)** thoroughfares where an urban curb and gutter cross section may be locally desirable because of urban development or redevelopment.

Recommended design standards relating to maximum and minimum grades, minimum sight distances, maximum degree of curve and related super elevation, and other considerations for thoroughfares are given in **Appendix C**. This Appendix gives definitions and design standards recommended for inclusion in subdivision regulations.

Cross section "A" is typical for controlled access freeways. The 13.8 m (46′) grassed median is the minimum desirable median width, but there could be some variation from this depending upon design considerations. Right-of-way requirements would typically vary upward from 68.4 m (228′) depending upon cut and fill requirements.

Cross section "B" is typical for four lane divided highways in rural areas which may have only partial or no control of access. The minimum median width for this cross section is 13.8 m (46′), but a wider median is desirable. Design requirements for slopes and drainage would be similar to cross section "A", but there may be some variation from this depending upon right-of-way constraints.

Cross section "C", seven lane urban, should not be used for new projects. When the conditions warrant six lanes, cross section "E" should be recommended. Cross section "C" should be used only in special situations such as when widening from a five lane section and right-of-way is limited. Even in these situations, consideration should be given to converting the center turn lane to a median so that cross section "E" is the final cross section.

Cross section "D", five lane urban, is typical for major thoroughfares where frequent left turns are anticipated as a result of abutting development or frequent street intersections.

Cross sections "E" and "F" are used on major thoroughfares where left turns and intersecting streets are not as frequent. Left turns would be restricted to a few selected intersections. The 4.8 m (16′) median is the minimum recommended for an urban boulevard type cross section. In most instances, monolithic construction should be utilized due to greater cost effectiveness, ease and speed of placement, and reduced future maintenance requirements. In special cases, grassed or landscaped medians may be used in urban areas. However, these types of medians result in greatly increased maintenance costs and an increased danger to maintenance personnel. Non-monolithic medians should only be recommended when the above concerns are addressed.

Cross section "G" is recommended for urban boulevards or parkways to enhance the urban environment and to improve the compatibility of major thoroughfares with residential areas. A minimum median width of 7.2 m (24′) is recommended with 9.0 m (30′) being desirable.

Cross section "H" is recommended for major thoroughfares where projected travel indicates a need for four travel lanes but traffic is not excessively high, left turning movements are light, and right-of-way is restricted. An additional left turn lane would probably be required at major intersections. This cross section should be used only if the above criteria is met. If right-of-way is not restricted, future strip development could take place and the inner lanes could become de facto left turn lanes.

In urban environments, proposed thoroughfares which function as one-way traffic carriers typically require **cross section "I"**. **Cross sections "J"** and **"K"** are usually recommended for urban minor thoroughfares since these facilities usually serve both land service and traffic service functions. **Cross section "J"** would be used on those minor thoroughfares where parking on both sides is needed as a result of more intense development.

Cross section "L" is used in rural areas or for staged construction of a wider multi-lane cross section. On some thoroughfares, projected traffic volumes may indicate that two travel lanes will adequately serve travel for a considerable period of time. For areas that are growing and future widening will be necessary, the full right-of-way of 30 m (100') should be required. In some instances, local ordinances may not allow the full 30 m (100'). In those cases, 21 m (70') should be preserved with the understanding that the full 30 m (100') will be preserved by use of building setbacks and future street line ordinances.

Cross section "N" is used in rural areas where a truck climbing lane is needed.

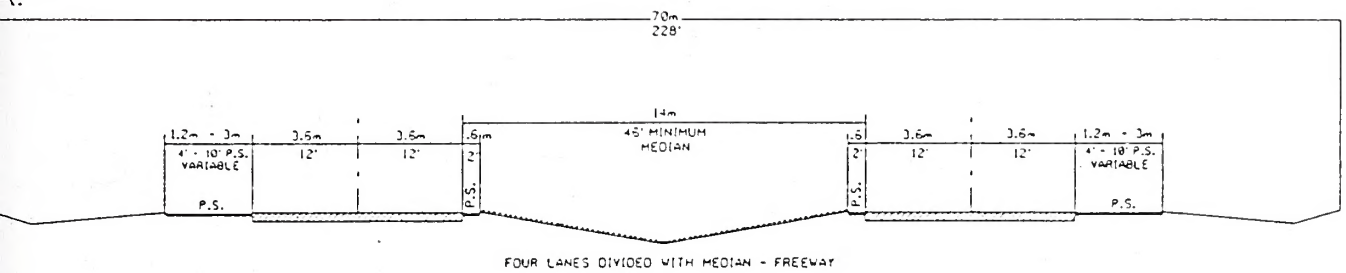
The urban curb and gutter cross sections all illustrate the sidewalk adjacent to the curb with a buffer or utility strip between the sidewalk and the minimum right-of-way line. This permits adequate setback for utility poles. If it is desired to move the sidewalk farther away from the street to provide additional separation for pedestrians or for aesthetic reasons, additional right-of-way must be provided to insure adequate setback for utility poles.

The right-of-ways shown for the typical cross sections are the minimum rights-of-way required to contain the street, sidewalks, utilities, and drainage facilities. Cut and fill requirements may require either additional right-of-way or construction easements. Obtaining construction easements is becoming the more common practice for urban thoroughfare construction.

If there is sufficient bicycle travel along the thoroughfare to justify a bicycle lane or bikeway, additional right-of-way may be required to contain the bicycle facilities. The North Carolina Bicycle Facilities Planning and Design Guidelines should be consulted for design standards for bicycle facilities. **Cross sections O, P** and **Q** are typically used to accommodate bicycle travel.

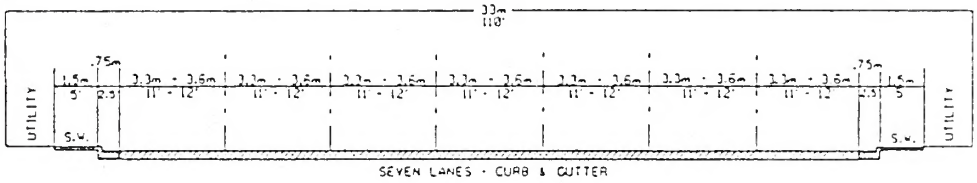
TYPICAL THOROUGHFARE CROSS SECTIONS

A.



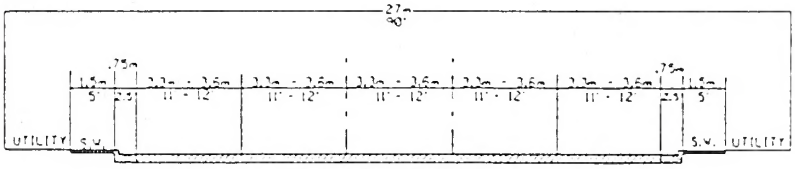
FOUR LANES DIVIDED WITH MEDIAN - FREEWAY

B.



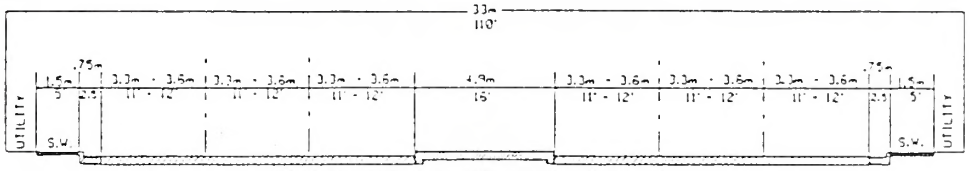
SEVEN LANES - CURB & GUTTER

C.



FIVE LANES - CURB & GUTTER

D.

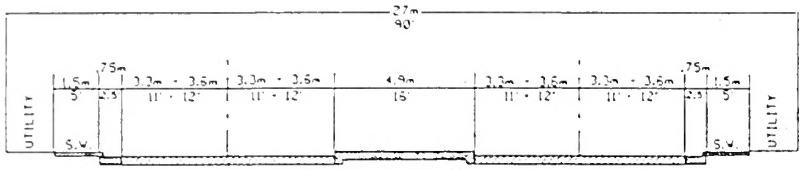


SIX LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

FIGURE 8

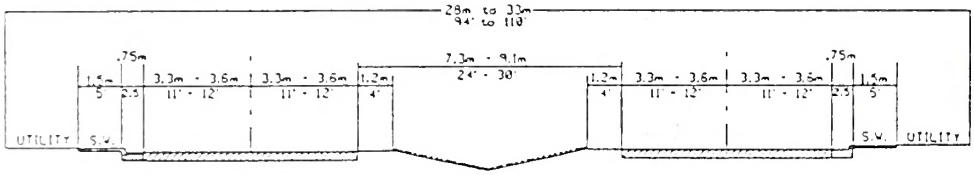
TYPICAL THOROUGHFARE CROSS SECTIONS

E.



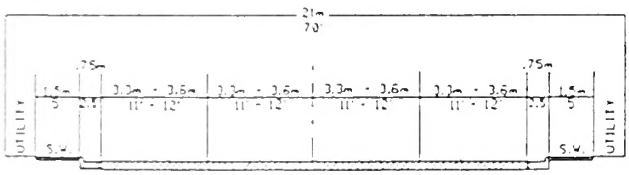
FOUR LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

F.



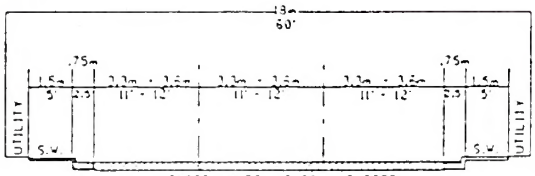
FOUR LANES DIVIDED - BOULEVARD
GRASS MEDIAN

G.



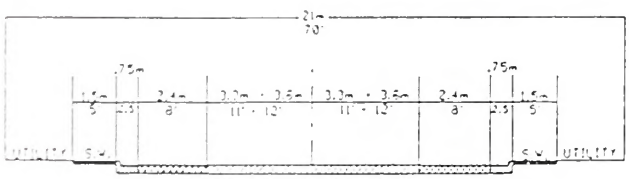
FOUR LANES - CURB & GUTTER

H.



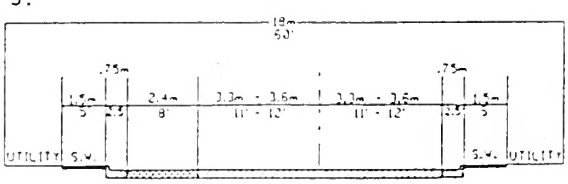
THREE LANES - CURB & GUTTER

I.



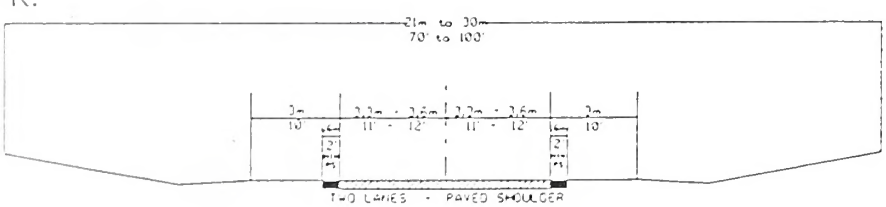
TWO LANES - CURB & GUTTER
PARKING ON EACH SIDE

J.



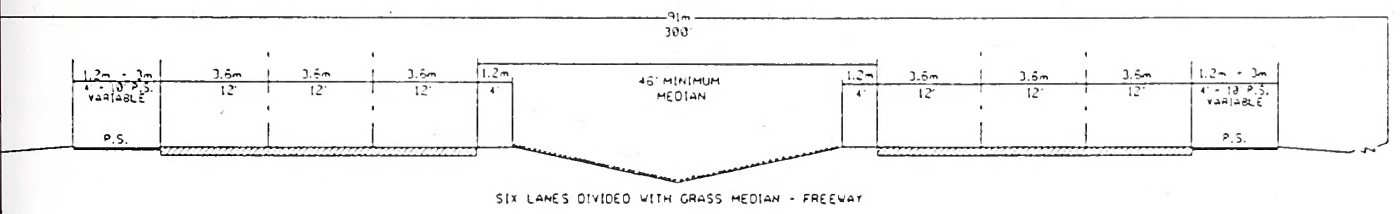
TWO LANES - CURB & GUTTER
PARKING ON ONE SIDE

K.



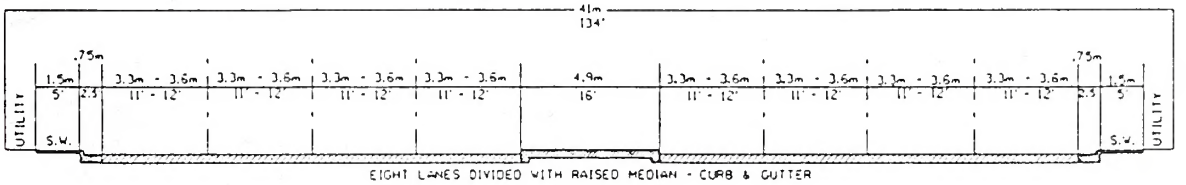
TWO LANES - PAVED SHOULDER

TYPICAL THOROUGHFARE CROSS SECTIONS



SIX LANES DIVIDED WITH GRASS MEDIAN - FREEWAY

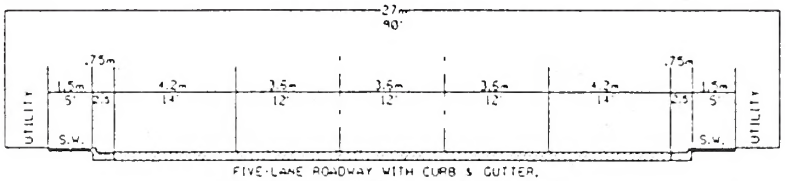
M.



EIGHT LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

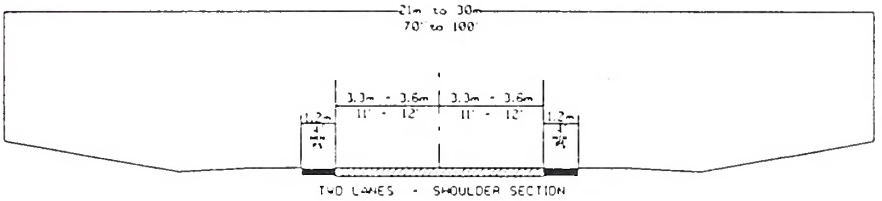
TYPICAL THOROUGHFARE CROSS SECTIONS FOR ACCOMMODATING BICYCLES

N.



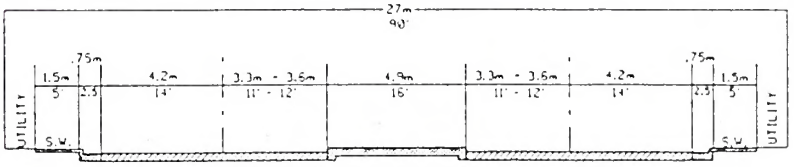
FIVE-LANE ROADWAY WITH CURB & GUTTER,
STANDARD INSIDE LANES & WIDENED CURB LANES

O.



TWO LANES - SHOULDER SECTION

P.



FOUR LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER,
STANDARD INSIDE LANES & WIDENED CURB LANES

APPENDIX B
Thoroughfare Plan Street Tabulation and Recommendations

FACILITY & SECTION	EXISTING CROSS-SECTION S.I. UNITS DIST km	RDWY m	ROW m	ENGLISH UNITS DIST MI	RDY FT	ROW FT	NUMBER of LANES	PRACTICAL CAPACITY CURRENT (FUTURE)	1991 ADTS	2020 ADTS	RECOMMENDED X - SECTION RDWAY (m)	ROW (m)
Interstate 40												
West PAB - NC 215	4.46	14.63	76.22	2.77	48	250	4	54000	28700	53100	ADQ	ADQ
NC 215 - Newfound St.	3.19	14.63	76.22	1.98	48	250	4	54000	28100	51300	ADQ	ADQ
Newfound St. - East PAB	2.45	14.63	76.22	1.52	48	250	4	54000	28100	53500	ADQ	ADQ
US 19/23/74												
West - 300 m west of PAB SR 1577	2.46	14.63	60.98	1.53	48	200	4	40000	11700	26800	ADQ	ADQ
300 m west - SR 1577 of SR 1577	0.21	20.73	60.98	0.13	68	200	4	40000	11700	26800	ADQ	ADQ
SR 1577 - NC 215	0.92	20.73	60.98	0.57	68	200	5	38000	---	36100	ADQ	ADQ
NC 215 - 270 m east of NC 215	0.27	20.73	UK	0.17	68	UK	5	38000	16200	36500	ADQ	ADQ

PAB - PLANNING AREA BOUNDARY **ADQ - ADEQUATE** **NC - NO CHANGE** **MP - MILE POST** **UK - UNKNOWN**

APPENDIX B
Thoroughfare Plan Street Tabulation and Recommendations

FACILITY & SECTION	EXISTING CROSS-SECTION S.I. UNITS DIST km	RDWY m	ROW m	ENGLISH UNITS DIST MI	RDY FT	ROW FT	NUMBER of LANES	PRACTICAL CAPACITY CURRENT (FUTURE)	1991 ADTS	2020 ADTS	RECOMMENDED X - SECTION RDWAY (m)	ROW (m)
US 19/23/74 continued												
270 m east - Park St. of NC 215	0.34	15.85	18.29	0.21	52	60	5	38000	21300	36500	ADQ	ADQ
Park St. - Penland St. **1**	0.19	9.15	18.29	0.12	30	60	2	16000	---	13500	ADQ	ADQ
Penland St. - NC 110 **1**	0.11	10.37	18.29	0.07	34	60	2	16000	4350	14100	ADQ	ADQ
NC 110 - Academy St. **1**	0.31	9.15	18.29	0.19	30	60	2	16000	---	12800	ADQ	ADQ
Academy St - Church St **1**	0.14	9.15	18.29	0.09	30	60	2	16000	3650	15500	ADQ	ADQ
Church St. - Cabe St. **2**	0.06	8.84	9.15	0.04	29	30	2	16000	3300	16100	ADQ	ADQ
Cabe St. - 60 m east of NC 110 **2**	0.27	14.94	UK	0.17	49	UK	3	22000	---	13300	ADQ	ADQ
60 m east - NC 110 **2** of NC 110	0.06	9.15	9.15	0.04	30	30	2	16000	---	13300	ADQ	ADQ

PAB - PLANNING AREA BOUNDARY **ADQ - ADEQUATE** **NC - NO CHANGE** **MP - MILE POST** **UK - UNKNOWN** **1 - ONE-WAY (eastbound)** **2 - ONE-WAY (westbound)**

APPENDIX B
Thoroughfare Plan Street Tabulation and Recommendations

FACILITY & SECTION	EXISTING CROSS-SECTION S.I. UNITS DIST km	RDWY m	ROW m	ENGLISH UNITS DIST MI	RDY FT	ROW FT	NUMBER of LANES	PRACTICAL CAPACITY CURRENT (FUTURE)	1991 ADTS	2020 ADTS	RECOMMENDED X - SECTION RDWAY (m)	ROW (m)
US 19/23/74 continued												
NC 110 - Penland St. **2**	0.19	9.15	9.15	0.12	30	30	2	16000	4450	14600	ADQ	ADQ
Penland St - Clyde St **2**	0.16	9.15	9.15	0.10	30	30	2	16000	---	14000	ADQ	ADQ
Church St. - Bridge St. @ Main St.	0.06	11.59	18.29	0.04	38	60	4	18000	---	31600	D	27.0
Bridge St. - Old Asheville Rd.	0.34	8.54	12.20	0.21	28	40	2	12000	---	17500	D	27.0
Old Asheville Rd. - Smathers Street	0.27	10.67	30.49	0.17	35	100	3	16000	---	17500	D	ADQ
Smathers Street - Southeastern Loop	0.93	10.06	45.73	0.58	33	150	3	16000	---	17600	D	ADQ
Southeastern Loop - SR 1200 Buncombe Co	1.95	10.06	45.73	1.21	33	150	3	16000	9400	23500	D	ADQ

PAB - PLANNING AREA BOUNDARY **ADQ - ADEQUATE** **NC - NO CHANGE** **MP - MILE POST** **UK - UNKNOWN** **1 - ONE-WAY (eastbound)** **2 - ONE-WAY (westbound)**

APPENDIX B
Thoroughfare Plan Street Tabulation and Recommendations

FACILITY & SECTION	EXISTING CROSS-SECTION S.I. UNITS DIST km	RDWY m	ROW m	ENGLISH UNITS DIST MI	RDY FT	ROW FT	NUMBER of LANES	PRACTICAL CAPACITY CURRENT (FUTURE)	1991 ADTS	2020 ADTS	RECOMMENDED X - SECTION RDWAY (m)	ROW (m)
NC 110												
SR 1862 - Southeastern Loop	0.89	7.32	30.49	0.55	24	100	2	13000	7000	12500	ADQ	ADQ
Southeastern Loop - NC 215 Connector	0.52	7.32	30.49	0.32	24	100	2	13000	7800	7300	ADQ	ADQ
NC 215 Connector - Substation Road	1.01	7.32	30.49	0.63	24	100	2	13000	8200	1200	ADQ	ADQ
Substation Road - Locust Street	0.45	7.32	18.29	0.28	24	60	2	12000	---	1500	ADQ	ADQ
Locust St. - 260 m south of Main St.	0.47	7.32	18.29	0.29	24	60	2	12000	---	2500	ADQ	ADQ
260 m south of Main St. - Main St.	0.26	8.54	12.20	0.16	28	40	2	12000	5900	2500	ADQ	ADQ
Main St. - Park St.	0.11	6.10	UK	0.07	20	UK	2	9500	---	1250	ADQ	ADQ

PAB - PLANNING AREA BOUNDARY **ADQ - ADEQUATE** **NC - NO CHANGE** **MP - MILE POST** **UK - UNKNOWN**

APPENDIX B
Thoroughfare Plan Street Tabulation and Recommendations

FACILITY & SECTION	EXISTING CROSS-SECTION S.I. UNITS DIST km	RDWY m	ROW m	ENGLISH UNITS DIST MI	RDY FT	ROW FT	NUMBER of LANES	PRACTICAL CAPACITY CURRENT (FUTURE)	1991 ADTS	2020 ADTS	RECOMMENDED X - SECTION RDWAY (m)	ROW (m)
NC 215												
South - SR 1823 PAB	0.31	5.49	18.29	0.19	18	60	2	8000	1300	1400	6.6	ADQ
SR 1823 - NC 215 Connector	1.61	5.49	18.29	1.00	18	60	2	8000	---	2500	6.6	ADQ
NC 215 - SR 1829 Connector	0.23	5.49	18.29	0.14	18	60	2	8000	1700	8200	L	21.0
SR 1829 - Penland St.	1.30	12.20	18.29	0.81	40	60	2	12000	---	8000	ADQ	ADQ
Penland St. - Park St.	0.34	6.71	15.24	0.21	22	40	2	11000	---	9000	ADQ	ADQ
Park St. - NC 215 North @ US 19/23/74	**Same as US 19/23/74 from NC 215 to Park St.**											
US 19/23/74 - SR 1523	0.08	19.51	30.49	0.05	64	100	5	28000	---	6400	ADQ	ADQ
SR 1523 - Rosewood	1.06	15.85	45.73	0.66	52	150	4	22000	---	5200	ADQ	ADQ

PAB - PLANNING AREA BOUNDARY **ADQ - ADEQUATE** **NC - NO CHANGE** **MP - MILE POST** **UK - UNKNOWN** **3 - ONE-WAY (northbound)** **4 - ONE-WAY (southbound)**

APPENDIX B
Thoroughfare Plan Street Tabulation and Recommendations

FACILITY & SECTION	EXISTING CROSS-SECTION S.I. UNITS DIST km	RDWY m	ROW m	ENGLISH UNITS DIST MI	RDY FT	ROW FT	NUMBER of LANES	PRACTICAL CAPACITY CURRENT (FUTURE)	1991 ADTS	2020 ADTS	RECOMMENDED X - SECTION RDWAY (m)	ROW (m)
NC 215 continued												
Rosewood - Fiberville 3 Road	0.10	9.76	18.29	0.06	32	60	2	16000	---	2700	ADQ	ADQ
Fiberville - NC 215 Road Southbound	0.14	15.85	36.59	0.09	52	120	4	22000	6600	6800	ADQ	ADQ
NC 215 - Rosewood 4 Southbound	0.18	8.54	30.49	0.11	28	100	2	14000	---	2500	ADQ	ADQ
NC 215 - SR 1585 Southbound	0.92	15.85	30.49	0.57	52	100	4	22000	6600	6500	ADQ	ADQ
SR 1585 - SR 1513	0.14	19.51	30.49	0.09	64	100	5	22000	---	7800	ADQ	ADQ
SR 1513 - Interstate 40	0.61	19.51	30.49	0.38	64	100	5	22000	5400	6900	ADQ	ADQ
NC 215 Connector												
NC 110 - NC 215	0.72	--	--	0.45	--	--	-	(12000)	---	6400	L	30.0

PAB - PLANNING AREA BOUNDARY **ADQ - ADEQUATE** **NC - NO CHANGE** **MP - MILE POST** **UK - UNKNOWN** **3 - ONE-WAY (northbound)** **4 - ONE-WAY (southbound)**

APPENDIX B
Thoroughfare Plan Street Tabulation and Recommendations

FACILITY & SECTION	EXISTING CROSS-SECTION S.I. UNITS DIST km	RDWY m	ROW m	ENGLISH UNITS DIST MI	RDY FT	ROW FT	NUMBER of LANES	PRACTICAL CAPACITY CURRENT (FUTURE)	1991 ADTS	2020 ADTS	RECOMMENDED X - SECTION RDWAY (m)	ROW (m)
Southeastern Loop												
US 19/23/74 at SR 1836 - SR 1847 at SR 1851	2.99	--	--	1.85	--	--	-	(12000)	---	6000	N	40.0
SR 1847 at SR 1851 - NC 110	1.84	--	--	1.14	--	--	-	(12000)	---	5600	N	40.0
Newfound Road												
SR 1606 - Interstate 40	1.50	6.10	UK	0.93	20	UK	2	9000	---	5800	L	21.0
Interstate 40 - Beaverdam Road	0.52	6.10	UK	0.32	20	UK	2	9000	2500	6100	L	21.0
Beaverdam Road - North Main Street	0.61	5.49	18.29	0.38	18	60	2	8000	---	8600	L	ADQ

PAB - PLANNING AREA BOUNDARY ADQ - ADEQUATE NC - NO CHANGE MP - MILE POST UK - UNKNOWN

APPENDIX B
Thoroughfare Plan Street Tabulation and Recommendations

FACILITY & SECTION	EXISTING CROSS-SECTION S.I. UNITS DIST km	RDWY m	ROW m	ENGLISH UNITS DIST MI	RDY FT	ROW FT	NUMBER of LANES	PRACTICAL CAPACITY CURRENT (FUTURE)	1991 ADTS	2020 ADTS	RECOMMENDED X - SECTION RDWAY (m)	ROW (m)
North Main St.												
Newfound Road - Trammell Avenue	0.43	5.49	--	0.27	18	--	2	(12000)	---	1100	L	21.0
Trammell Avenue - Fiberville Road	1.16	7.62	UK	0.72	25	UK	2	12000	---	2500	ADQ	ADQ
Bridge Street												
Church Street - Newfound Street	0.21	8.53	18.29	0.13	28	60	2	12000	6000	14500	D	27.0
Newfound Street - Fiberville Road	0.16	9.75	18.29	0.10	32	60	2	12000	---	6900	D	27.0
Fiberville Road												
Bridge Street - NC 215 Northbound	1.22	14.02	18.29	0.76	46	60	4	22000	---	6400	ADQ	ADQ

PAB - PLANNING AREA BOUNDARY **ADQ - ADEQUATE** **NC - NO CHANGE** **MP - MILE POST** **UK - UNKNOWN**

APPENDIX B
Thoroughfare Plan Street Tabulation and Recommendations

FACILITY & SECTION	EXISTING CROSS-SECTION S.I. UNITS DIST km	RDWY m	ROW m	ENGLISH UNITS DIST MI	RDY FT	ROW FT	NUMBER of LANES	PRACTICAL CAPACITY CURRENT (FUTURE)	1991 ADTS	2020 ADTS	RECOMMENDED X - SECTION RDWAY (m)	ROW (m)
Thickety Road (SR 1513)												
West PAB - 400 m south of I-40	1.50	4.88	UK	0.93	16	UK	2	6000	350	800	6.6	21.0
400 m south - I-40 of I-40	0.40	6.10	UK	0.25	20	UK	2	9500	350	800	6.6	21.0
I-40 - I-40	4.07	4.88	UK	2.53	16	UK	2	6000	500	1000	6.6	21.0
I-40 - SR 1550	0.35	6.10	UK	0.22	20	UK	2	9500	900	2200	6.6	21.0
SR 1550 - NC 215	0.58	4.88	UK	0.36	16	UK	2	6000	2200	4400	6.6	21.0
SR 1523												
SR 1540 - SR 1577	3.20	5.49	UK	1.99	18	UK	2	8000	1600	2000	6.6	21.0
SR 1577 - NC 215	1.22	5.49	UK	0.76	18	UK	2	8000	---	3200	6.6	21.0

PAB - PLANNING AREA BOUNDARY **ADQ - ADEQUATE** **NC - NO CHANGE** **MP - MILE POST** **UK - UNKNOWN**

APPENDIX B
Thoroughfare Plan Street Tabulation and Recommendations

FACILITY & SECTION	EXISTING CROSS-SECTION S.I. UNITS DIST km	RDWY m	ROW m	ENGLISH UNITS DIST MI	RDY FT	ROW FT	NUMBER of LANES	PRACTICAL CAPACITY CURRENT (FUTURE)	1991 ADTS	2020 ADTS	RECOMMENDED X - SECTION RDWAY (m)	ROW (m)
Beaverdam School Road (SR 1585)												
NC 215 - 480 m west of SR 1589	0.14	5.49	UK	0.09	18	UK	2	8000	---	1300	L	21.0
480 m west - SR 1589 of SR 1589	0.48	4.88	UK	0.30	16	UK	2	6000	---	1300	L	21.0
SR 1589 - 260 m south of I-40	0.32	5.49	UK	0.20	18	UK	2	8000	---	4100	L	21.0
260 m south - 65 m north of I-40 of I-40	0.32	7.32	UK	0.20	24	UK	2	12000	---	4100	L	21.0
65 m north - Beaverdam of I-40 Road	0.98	5.49	UK	0.61	18	UK	2	8000	1400	3900	L	21.0

PAB - PLANNING AREA BOUNDARY **ADQ - ADEQUATE** **NC - NO CHANGE** **MP - MILE POST** **UK - UNKNOWN**

APPENDIX B
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FACILITY & SECTION	EXISTING CROSS-SECTION S.I. UNITS DIST km	RDWY m	ROW m	ENGLISH UNITS DIST MI	RDY FT	ROW FT	NUMBER of LANES	PRACTICAL CAPACITY CURRENT (FUTURE)	1991 ADTS	2020 ADTS	RECOMMENDED X - SECTION RDWAY (m)	ROW (m)
Beaverdam Road (SR 1613)												
Newfound Road - 150 m west of Newfound Rd.	0.15	--	---	0.09	--	--	-	(12000)	---	---	L	30.0
150 m west of Newfound Rd. - SR 1585	1.43	5.49	UK	0.89	18	UK	2	8000	---	2500	L	30.0
SR 1585 - North PAB	1.37	4.88	UK	0.85	16	UK	2	6000	---	900	6.6	21.0
Newfound Street												
North Main St. - Trammell Ave.	1.37	6.71	UK	0.85	22	UK	2	11000	---	8000	ADQ	ADQ
Trammell Ave - Bridge St	0.37	6.71	UK	0.23	22	UK	2	11000	---	10000	ADQ	ADQ
Beaverdam St.												
NC 215 - Cherry St.	0.61	5.49	9.14	0.38	18	30	2	5000	---	4500	6.6	21.0

PAB - PLANNING AREA BOUNDARY **ADQ - ADEQUATE** **NC - NO CHANGE** **MP - MILE POST** **UK - UNKNOWN**

APPENDIX B
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FACILITY & SECTION	EXISTING CROSS-SECTION S.I. UNITS DIST km	RDWY m	ROW m	ENGLISH UNITS DIST MI	RDY FT	ROW FT	NUMBER of LANES	PRACTICAL CAPACITY CURRENT (FUTURE)	1991 ADTS	2020 ADTS	RECOMMENDED X - SECTION RDWAY (m)	ROW (m)
Thompson St.												
Cherry St. - Ferguson St	1.16	6.10	10.67	0.72	20	35	2	5000	---	1800	ADQ	ADQ
Ferguson St. - North Main St.	0.14	6.10	10.67	0.09	20	35	2	5000	---	1100	ADQ	ADQ
Cherry / Hill Streets												
Beaverdam St. - High St.	0.43	7.32	9.14	0.27	24	30	2	9000	---	3300	ADQ	ADQ
High St. - 60 m North of Ott Place	0.03	--	--	0.02	-	--	--	-----	---	3300	L	21.0
60 m North of Ott Pl. - North Main Street	0.24	5.49	9.14	0.15	18	30	2	5000	---	3900	L	ADQ
Dutch Cove Rd / SR 1854/ Academy St.												
SR 1849 - SR 1835	2.56	6.10	UK	1.60	20	UK	2	9000	---	1000	ADQ	ADQ

PAB - PLANNING AREA BOUNDARY **ADQ - ADEQUATE** **NC - NO CHANGE** **MP - MILE POST** **UK - UNKNOWN**

APPENDIX B
Thoroughfare Plan Street Tabulation and Recommendations

FACILITY & SECTION	EXISTING CROSS-SECTION S.I. UNITS DIST km	RDWY m	ROW m	ENGLISH UNITS DIST MI	RDY FT	ROW FT	NUMBER of LANES	PRACTICAL CAPACITY CURRENT (FUTURE)	1991 ADTS	2020 ADTS	RECOMMENDED X - SECTION RDWAY (m)	ROW (m)
Dutch Cove Rd / SR 1854/ Academy St. continued												
SR 1835 - Spring St.	1.58	5.49	15.24	0.98	18	50	2	8000	---	1000	6.0	ADQ
Spring St. - Locust St.	0.52	6.71	12.19	0.32	22	40	2	11000	---	6500	ADQ	ADQ
Locust St. - Main St.	0.53	8.53	12.19	0.33	28	40	2	11000	---	7200	ADQ	ADQ
Main St. - Park St.	0.08	9.14	12.19	0.05	30	40	2	12000	---	3600	ADQ	ADQ
Rhoda Street												
SR 1854 - NC 110	1.67	6.10	13.72	1.04	20	45	2	9000	---	1000	ADQ	ADQ
Substation Road												
NC 110 - Pigeon St.	0.34	6.10	18.29	0.21	20	60	2	9000	---	700	ADQ	ADQ

PAB - PLANNING AREA BOUNDARY **ADQ - ADEQUATE** **NC - NO CHANGE** **MP - MILE POST** **UK - UNKNOWN**

APPENDIX B
Thoroughfare Plan Street Tabulation and Recommendations

FACILITY & SECTION	EXISTING CROSS-SECTION S.I. UNITS DIST km	RDWY m	ROW m	ENGLISH UNITS DIST MI	RDY FT	ROW FT	NUMBER of LANES	PRACTICAL CAPACITY CURRENT (FUTURE)	1991 ADTS	2020 ADTS	RECOMMENDED X - SECTION RDWAY (m)	ROW (m)
SR 1924												
NC 215 - Pigeon St.	0.61	5.49	18.29	0.38	18	60	2	8000	---	200	ADQ	ADQ
Pigeon St.												
SR 1924 - Substation Rd.	0.06	7.32	UK	0.04	24	UK	2	12000	---	200	ADQ	ADQ

PAB - PLANNING AREA BOUNDARY **ADQ - ADEQUATE** **NC - NO CHANGE** **MP - MILE POST** **UK - UNKNOWN**

APPENDIX C

RECOMMENDED SUBDIVISION ORDINANCES IN SI UNITS

DEFINITIONS

I. Streets and Roads:

A. Rural Roads

1. Principal Arterial - A rural link in a highway system serving travel, and having characteristics indicative of substantial statewide or interstate travel and existing solely to serve traffic. This network would consist of Interstate routes and other routes designated as principal arterials.

2. Minor Arterial - A rural roadway joining cities and larger towns and providing intra-state and inter-county service at relatively high overall travel speeds with minimum interference to through movement.

3. Major Collector - A road which serves major intra-county travel corridors and traffic generators and provides access to the Arterial system.

4. Minor Collector - A road which provides service to small local communities and traffic generators and provides access to the Major Collector system.

5. Local Road - A road which serves primarily to provide access to adjacent land, over relatively short distances.

B. Urban Streets

1. Major Thoroughfares - Major thoroughfares consist of Interstate, other freeway, expressway, or parkway roads, and major streets that provide for the expeditious movement of high volumes of traffic within and through urban areas.

2. Minor Thoroughfares - Minor thoroughfares perform the function of collecting traffic from local access streets and carrying it to the major thoroughfare system. Minor thoroughfares may be used to supplement the major thoroughfare system by facilitating minor through-traffic movements and may also serve abutting property.

3. Local Street - A local street is any street not on a higher order urban system and serves primarily to provide direct access to abutting land.

C. Specific Type Rural or Urban Streets

1. Freeway, expressway, or parkway - Divided multilane roadways designed to carry large volumes of traffic at high speeds. A freeway provides for continuous flow of vehicles with no direct access to abutting property and with access to selected crossroads only by way of interchanges. An expressway is a facility with full or partial control of access and generally with grade separations at major intersections. A parkway is for non-commercial traffic, with full or partial control of access.

2. Residential Collector Street - A local street which serves as a connector street between local residential streets and the thoroughfare system. Residential collector streets typically collect traffic from 100 to 400 dwelling units.

3. Local Residential Street - Cul-de-sacs, loop streets less than 750 meters in length, or streets less than one and a half kilometers in length that do not connect thoroughfares, or serve major traffic generators, and do not collect traffic from more than 100 dwelling units.

4. Cul-de-sac - A short street having only one end open to traffic and the other end being permanently terminated and a vehicular turn-around provided.

5. Frontage Road - A road that is parallel to a partial or full access controlled facility and provides access to adjacent land.

6. Alley - A strip of land, owned publicly or privately, set aside primarily for vehicular service access to the back side of properties otherwise abutting on a street.

II. Property

A. Building Setback Line - A line parallel to the street in front of which no structure shall be erected.

B. Easement - A grant by the property owner for use by the public, a corporation, or person(s), of a strip of land for a specific purpose.

C. Lot - A portion of a subdivision, or any other parcel of land, which is intended as a unit for transfer of ownership or for development or both. The word "lot" includes the words "plat" and "parcel".

III. Subdivision

A. Subdivider - Any person, firm, corporation or official agent thereof, who subdivides of develops any land deemed to be a subdivision.

B. Subdivision - All divisions of a tract or parcel of land into two or more lots, building sites, or other divisions for the purpose, immediate or future, of sale or building development and all divisions of land involving the dedication of a new street or change in existing streets; provided, however, that the following shall not be included within this definition nor subject to these regulations: (1) the combination or recombination of portions of previously platted lots where the total number of lots is not increased and the resultant lots are equal to or exceed the standards contained herein; (2) the division of land into parcels greater than four hectares where no street right-of-way dedication is involved, (3) the public acquisition, by purchase, of strips of land for the widening or the opening of streets; (4) the division of a tract in single ownership whose entire area is no greater than 0.8 hectares into not more than three lots, where no street right-of-way dedication is involved and where the resultant lots are equal to or exceed the standards contained herein.

C. Dedication - A gift, by the owner, of his property to another party without any consideration being given for the transfer. The dedication is made by written instrument and is completed with an acceptance.

D. Reservation - Reservation of land does not involve any transfer of property rights. It constitutes an obligation to keep property free from development for a stated period of time.

DESIGN STANDARDS

I. Streets and Roads

The design of all roads within the Planning Area shall be in accordance with the accepted policies of the North Carolina Department of Transportation, Division of Highways, as taken or modified from the American Association of State Highway Officials' (AASHTO) manuals.

The provision of street rights-of-way shall conform and meet the recommendations of the Thoroughfare Plan, as adopted by the municipality.

The proposed street layout shall be coordinated with the existing street system of the surrounding area. Normally the proposed streets should be the extension of existing streets if possible.

A. Right-of-way Widths - Right-of-way (ROW) widths shall not be less than the following and shall apply except in those cases where ROW requirements have been specifically set out in the Thoroughfare Plan.

	Min. ROW
1. Rural	
a. Principle Arterial	
Freeways	105 meters
Other	60 meters
b. Minor Arterial	30 meters
c. Major Collector	30 meters
d. Minor Collector	24 meters
e. Local Road	18 meters[1]
2. Urban	
a. Major Thoroughfare other than Freeway and Expressway	27 meters
b. Minor Thoroughfare	21 meters
c. Local Street	18 meters[1]
d. Cul-de-sac	Variable[2]

The subdivider will only be required to dedicate a maximum of 30 meters of right-of-way. In cases where over 30 meters of right-of-way is desired, the subdivider will be required only to reserve the amount in excess of 30 meters. On all cases in which right-of-way is sought for a fully controlled access facility, the subdivider will only be required to make a reservation. It is strongly recommended that subdivisions provide access to properties from internal streets, and that direct property access to major thoroughfares, principle and minor arterials, and major collectors be avoided. Direct property access to minor thoroughfares is also undesirable.

A partial width right-of-way, not less than eighteen meters in width, may be dedicated when adjoining undeveloped property that is owned or controlled by the subdivider; provided that the width of a partial dedication be such as to permit the installation of such facilities as may be necessary to serve abutting lots. When the said adjoining property is sub-divided, the remainder of the full required right-of-way shall be dedicated.

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[1] The desirable minimum right-of-way (ROW) is 18 meters. If curb and gutter is provided, 15 meters of ROW is adequate on local residential streets.

[2] The ROW dimension will depend on radius used for vehicular turn around. Distance from edge of pavement of turn around to ROW should not be less than distance from edge of pavement to ROW on street approaching turn around.

B. Street Widths - Widths for street and road classifications other than local shall be as recommended by the Thoroughfare Plan. Width of local roads and streets shall be as follows:

1. Local Residential
   Curb and Gutter section: 7.8 meters, face to face of curb
   Shoulder section: 6 meters to edge of pavement, 1.2 meters for shoulders

2. Residential Collector
   Curb and Gutter section: 10.2 meters, face to face of curb
   Shoulder section: 6 meters to edge of pavement, 1.8 meters for shoulders

C. Geometric Characteristics - The standards outlined below shall apply to all subdivision streets proposed for addition to the State Highway System or Municipal Street System. In cases where a subdivision is sought adjacent to a proposed thoroughfare corridor, the requirements of dedication and reservation discussed under Right-of-Way shall apply.

1. Design Speed - The design speed for a roadway should be a minimum of 10 km/h greater than the posted speed limit. The design speeds for subdivision type streets shall be:

DESIGN SPEEDS

Facility Type	Design Speed km/h		
	Desirable	Minimum Level	Minimum Rolling
RURAL			
Minor Collector Roads	100	80	70
Local roads including Residential Collectors and Local Residential	80	80	70
URBAN			
Major Thoroughfares other than Freeway or Expressway	100	80	80
Minor Thoroughfares	100	80	70
Local Streets	70	70	50

2. Maximum and Minimum Grades

a. The maximum grades in percent shall be:

MAXIMUM VERTICAL GRADE				
Facility Type	Design Speed (km/h)	Maximum Grade (Percent) Flat	Rolling	Mountainous
RURAL				
Minor Collector Roads*	30	7	10	12
	50	7	9	10
	60	7	8	10
	90	6	7	9
	100	5	6	8
	110	4	5	6
Local roads including Residential Collectors and Local Residential Streets*	30	-	11	16
	50	7	10	14
	60	7	9	12
	90	6	8	10
	100	5	6	-
URBAN				
Major Thoroughfares other than Freeway or Expressway	50	8	9	11
	60	7	8	10
	90	6	7	9
	100	5	6	8
Minor Thoroughfares*	30	9	10	12
	50	9	9	10
	60	9	8	10
	90	7	7	9
	100	6	6	8
	110	5	5	6
Local Streets*	30	-	12	17
	50	8	11	15
	60	8	10	13
	90	7	9	11
	100	6	7	-

b. Minimum grade should not be less than 0.5% .

c. Grades for 30 meters each way from intersections (measured from edge of pavement) should not exceed 5%.

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* For streets and roads with projected annual average daily traffic less than 250 or short grades less than 150 meters long, grades may be 2% steeper than the values in the above table.

3. Minimum Sight Distance - In the interest of public safety, no less than the minimum sight distance applicable shall be provided. Vertical curves that connect each change in grade shall be provided and calculated using the following parameters:

SIGHT DISTANCE					
Design Speed (km/h)	30	50	60	90	100
Stopping Sight Distance					
Minimum (meters)	30	60	80	140	160
Desirable Minimum (meters)	30	70	90	170	210
Minimum K* Value for:					
Crest curve	3	10	18	71	105
Sag curve	4	12	18	40	51

(General practice calls for vertical curves to be multiples of 10 meters. Calculated lengths shall be rounded up in each case.)

4. The "Superelevation Table" shown below and continued on the next page shows the minimum radius and the related maximum superelevation for design speeds. The maximum rate of roadway superelevation (e) for rural roads with no curb and gutter is 0.08. The maximum rate of superelevation for urban streets with curb and gutter is 0.06, with 0.04 being desirable.

SUPERELEVATION TABLE		
Design Speed (km/h)	Maximum e	Minimum Radius (meters)
50	0.04	100
60	0.04	150
90	0.04	375
100	0.04	490

* K is a coefficient by which the algebraic difference in grade may be multiplied to determine the length in meters of the vertical curve which will provide the desired sight distance. Sight distance provided for stopped vehicles at intersections should be in accordance with "A Policy on Geometric Design of Highways and Streets, 1990".

SUPERELEVATION TABLE continued		
Design Speed (km/h)	Maximum e	Minimum Radius (meters)
50	0.06	90
60	0.06	135
90	0.06	335
100	0.06	435
50	0.08	80
60	0.08	125
90	0.08	305
100	0.08	395

e = rate of roadway superelevation, meter per meter

D. Intersections

1. Streets shall be laid out so as to intersect as nearly as possible at right angles, and no street should intersect any other street at an angle less than sixty-five (65) degrees.

2. Property lines at intersections should be set so that the distance from the edge of pavement, of the street turnout, to the property line will be at least as great as the distance from the edge of pavement to the property line along the intersecting streets. This property line can be established as a radius or as a sight triangle. Greater offsets from the edge of pavement to the property lines will be required, if necessary, to provide sight distance for the stopped vehicle on the side street.

3. Off-set intersections are to be avoided. Intersections which cannot be aligned should be separated by a minimum length of 60 meters between survey centerlines.

E. Cul-de-sacs

Cul-de-sacs shall not be more than one hundred and fifty (150) meters in length. The distance from the edge of pavement on the vehicular turn around to the right-of-way line should not be less than the distance from the edge of pavement to right-of-way line on the street approaching the turn around. Cul-de-sacs should not be used to avoid connection with an existing street or to avoid the extension of an important street.

F. Alleys

1. Alleys shall be required to serve lots used for commercial and industrial purposes except that this requirement may be waived where other definite and assured provisions are made for service access. Alleys shall not be provided in residential subdivisions unless necessitated by unusual circumstances.

2. The width of an alley shall be at least six (6) meters.

3. Dead end alleys shall be avoided where possible, but if unavoidable, shall be provided with adequate turn around facilities at the dead end as may be required by the Planning Board.

G. Permits For Connection To State Roads

An approved permit is required for connection to any existing state system road. This permit is required prior to any construction on the street or road. The application is available at the office of the District Engineer of the Division of Highways.

H. Offsets To Utility Poles

Poles for overhead utilities should be located clear of roadway shoulders, preferably a minimum of at least 9 meters from the edge of pavement. On streets with curb and gutter, utility poles shall be set back a minimum distance of 1.8 meters from the face of curb.

I. Wheel Chair Ramps

All street curbs being constructed or reconstructed for maintenance purposes, traffic operations, repairs, correction of utilities, or altered for any reason, shall provide wheelchair ramps for the physically handicapped at intersections where both curb and gutter and sidewalks are provided and at other major points of pedestrian flow.

J. Horizontal Width on Bridge Deck

1. The clear roadway widths for new and reconstructed bridges serving 2 lane, 2 way traffic should be as follows:

'a. Shoulder section approach

i. Under 800 ADT design year

Minimum 8.4 meters width face to face of parapets, rails, or pavement width plus 3 meters, whichever is greater.

ii. 800 - 2000 ADT design year

Minimum 10.2 meters width face to face of parapets, rails, or pavement width plus 3.6 meters, whichever is greater.

iii. Over 2000 ADT design year

Minimum width of 12 meters, desirable width of 13.2 meters width face to face of parapets or rails.

b. Curb and gutter approach

i. Under 800 ADT design year

Minimum 7.2 meters face to face of curbs.

ii. Over 800 ADT design year

Width of approach pavement measured face to face of curbs.

Where curb and gutter sections are used on roadway approaches, curbs on bridges shall match the curbs on approaches in height, in width of face to face of curbs, and in crown drop. The distance from face of curb to face of parapet or rail shall be a minimum of 450 millimeters, or greater if sidewalks are required.

2. The clear roadway widths for new and reconstructed bridges having 4 or more lanes serving undivided two-way traffic should be as follows:

a. Shoulder section approach - Width of approach pavement plus width of usable shoulders on the approach left and right. (Shoulder width 2.4 m minimum, 3 m desirable.)

b. Curb and gutter approach - Width of approach pavement measured face to face of curbs.

TABLE 6

CONVERSION TABLE			
English Units		S.I. Units	Abbreviation
1 inch	equals	25 millimeters	(mm)
1 foot	equals	0.3 meters	(m)
1 mile	equals	1.6 kilometers	(km)
1 acre	equals	2.47 hectares	(hect)

METRIC EQUIVALENTS		
1 millimeter	equals	0.001 meters
1 kilometer	equals	1000 meters
1 hectare	equals	10,000 square meters

APPENDIX D

RECOMMENDED SUBDIVISION ORDINANCES IN ENGLISH UNITS

DEFINITIONS

I. Streets and Roads:

A. Rural Roads

1. Principal Arterial - A rural link in a highway system serving travel, and having characteristics indicative of substantial statewide or interstate travel and existing solely to serve traffic. This network would consist of Interstate routes and other routes designated as principal arterials.

2. Minor Arterial - A rural roadway joining cities and larger towns and providing intra-state and inter-county service at relatively high overall travel speeds with minimum interference to through movement.

3. Major Collector - A road which serves major intra-county travel corridors and traffic generators and provides access to the Arterial system.

4. Minor Collector - A road which provides service to small local communities and traffic generators and provides access to the Major Collector system.

5. Local Road - A road which serves primarily to provide access to adjacent land, over relatively short distances.

B. Urban Streets

1. Major Thoroughfares - Major thoroughfares consist of Interstate, other freeway, expressway, or parkway roads, and major streets that provide for the expeditious movement of high volumes of traffic within and through urban areas.

2. Minor Thoroughfares - Minor thoroughfares perform the function of collecting traffic from local access streets and carrying it to the major thoroughfare system. Minor thoroughfares may be used to supplement the major thoroughfare system by facilitating minor through-traffic movements and may also serve abutting property.

3. Local Street - A local street is any street not on a higher order urban system and serves primarily to provide direct access to abutting land.

C. Specific Type Rural or Urban Streets

1. Freeway, expressway, or parkway - Divided multilane roadways designed to carry large volumes of traffic at high speeds. A freeway provides for continuous flow of vehicles with no direct access to abutting property and with access to selected crossroads only by way of interchanges. An expressway is a facility with full or partial control of access and generally with grade separations at major intersections. A parkway is a for non-commercial traffic, with full of partial control or access.

2. Residential Collector Street - A local street which serves as a connector street between local residential streets and the thoroughfare system. Residential collector streets typically collect traffic from 100 to 400 dwelling units.

3. Local Residential Street - Cul-de-sacs, loop streets less than 2,500 feet in length, or streets less than one mile in length that do not connect thoroughfares, or serve major traffic generators, and do not collect traffic from more than 100 dwelling units.

4. Cul-de-sac - A short street having only one end open to traffic and the other end being permanently terminated and a vehicular turn-around provided.

5. Frontage Road - A road that is parallel to a partial or full access controlled facility and provides access to adjacent land.

6. Alley - A strip of land, owned publicly or privately, set aside primarily for vehicular service access to the back side of properties otherwise abutting on a street.

II. Property

A. Building Setback Line - A line parallel to the street in front of which no structure shall be erected.

B. Easement - A grant by the property owner for use by the public, a corporation, or person(s), of a strip of land for a specific purpose.

C. Lot - A portion of a subdivision, or any other parcel of land, which is intended as a unit for transfer of ownership or for development or both. The word "lot" includes the words "plat" and "parcel".

III. Subdivision

A. Subdivider - Any person, firm, corporation or official agent thereof, who subdivides of develops any land deemed to be a subdivision.

B. Subdivision - All divisions of a tract or parcel of land into two or more lots, building sites, or other divisions for the purpose, immediate or future, of sale or building development and all divisions of land involving the dedication of a new street or change in existing streets; provided, however, that the following shall not be included within this definition nor subject to these regulations: (1) the combination or recombination of portions of previously platted lots where the total number of lots is not increased and the resultant lots are equal to or exceed the standards contained herein; (2) the division of land into parcels greater than ten acres where no street right-of-way dedication is involved, (3) widening of opening of streets; (4) the division of a tract in single ownership whose entire area is no greater than two acres into not more than three lots, where no street right-of-way dedication is involved and where the resultant lots are equal to or exceed the standards contained herein.

C. Dedication - A gift, by the owner, of his property to another party without any consideration being given for the transfer. The dedication is made by written instrument and is completed with an acceptance.

D. Reservation - Reservation of land does not involve any transfer of property rights. It constitutes an obligation to keep property free from development for a stated period of time.

DESIGN STANDARDS

I. Streets and Roads

The design of all roads within the Planning Area shall be in accordance with the accepted policies of the North Carolina Department of Transportation, Division of Highways, as taken or modified from the American Association of State Highway Officials' (AASHTO) manuals.

The provision of street rights-of-way shall conform and meet the recommendations of the Thoroughfare Plan, as adopted by the municipality.

The proposed street layout shall be coordinated with the existing street system of the surrounding area. Normally the proposed streets should be the extension of existing streets if possible.

A. Right-of-way Widths - Right-of-way (ROW) widths shall not be less than the following and shall apply except in those cases where ROW requirements have been specifically set out the Thoroughfare Plan.

		Min. ROW
1.	Rural	
	a. Principle Arterial	
	Freeways	350 ft.
	Other	200 ft.
	b. Minor Arterial	100 ft.
	c. Major Collector	100 ft.
	d. Minor Collector	80 ft.
	e. Local Road	60 ft.[1]
2.	Urban	
	a. Major Thoroughfare other than Freeway and Expressway	90 ft.
	b. Minor Thoroughfare	70 ft.
	c. Local Street	60 ft.[1]
	d. Cul-de-sac	Variable[2]

The subdivider will only be required to dedicate a maximum of 100 feet of right-of-way. In cases where over 100 feet of right-of-way is desired, the subdivider will be required only to reserve the amount in excess of 100 feet. On all cases in which right-of-way is sought for a fully controlled access facility, the subdivider will only be required to make a reservation. It is strongly recommended that subdivisions provide access to properties from internal streets, and that direct property access to major thoroughfares, principle and minor arterials, and major collectors be avoided. Direct property access to minor thoroughfares is also undesirable.

A partial width right-of-way, not less than sixty feet in width, may be dedicated when adjoining undeveloped property that is owned or controlled by the subdivider; provided that the width of a partial dedication be such as to permit the installation of such facilities as may be necessary to serve abutting lots. When the said adjoining property is subdivided, the remainder of the full required right-of-way shall be dedicated.

B. Street Widths - Widths for street and road classifications other than local shall be as recommended by the Thoroughfare Plan. Width of local roads and streets shall be as follows:

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[1] The desirable minimum right-of-way (ROW) is 60 ft. If curb and gutter is provided, 50 feet of ROW is adequate on local residential streets.

[2] The ROW dimension will depend on radius used for vehicular turnaround. Distance from edge of pavement of turnaround to ROW should not be less than distance from edge of pavement to ROW on street approaching turnaround.

1. Local Residential
   Curb and Gutter section: 26 feet, face to face of curb
   Shoulder section: 20 feet to edge of pavement, 4 foot shoulders

2. Residential Collector
   Curb and Gutter section: 34 feet, face to face of curb
   Shoulder section: 20 feet to edge of pavement, 6 foot shoulders

C. Geometric Characteristics - The standards outlined below shall apply to all subdivision streets proposed for addition to the State Highway System or Municipal Street System. In cases where a subdivision is sought adjacent to a proposed thoroughfare corridor, the requirements of dedication and reservation discussed under Right-of-Way shall apply.

1. Design Speed - The design speed for a roadway should be a minimum of 5 mph greater than the posted speed limit. The design speeds for subdivision type streets shall be:

DESIGN SPEEDS

Facility Type	Design Speed		
	Desirable	Minimum	
		Level	Rolling
RURAL			
Minor Collector Roads	60	50	40
Local roads including Residential Collectors and Local Residential	50	50	40
URBAN			
Major Thoroughfares other than Freeway or Expressway	60	50	50
Minor Thoroughfares	60	50	40
Local Streets	40	40	30

2. Maximum and Minimum Grades

a. The maximum grades in percent shall be:

MAXIMUM VERTICAL GRADE		
Design Speed	Terrain Level	Rolling
60	4	5
50	5	6
40	6	7
30		9

b. Minimum grade should not be less than 0.5% .

c. Grades for 100 feet each way from intersections (measured from edge of pavement) should not exceed 5%.

d. For streets and roads with projected annual average daily traffic less than 250, short grades less than 500 feet long, may be 150% of the value in the above table.

3. Minimum Sight Distance - In the interest of public safety, no less than the minimum sight distance applicable shall be provided. Vertical curves that connect each change in grade shall be provided and calculated using the following parameters:

SIGHT DISTANCE				
Design Speed	30	40	50	60
Stopping Sight Distance				
Minimum (ft.)	200	275	400	525
Desirable Minimum (ft.)	200	325	475	650
Minimum K Value for:				
Crest curve	30	80	160	310
Sag curve	40	70	110	160

(General practice calls for vertical curves to be multiples of 50 feet. Calculated lengths shall be rounded up in each case.)

* K is a coefficient by which the algebraic difference in grade may be multiplied to determine the length in feet of the vertical curve which will provide the desired sight distance.

Sight distance provided for stopped vehicles at intersections should be in accordance with "A Policy on Geometric Design of Highways and Streets, 1984".

4. The "Superelevation Table" below shows the maximum degree of curve and related maximum superelevation for design speeds. The maximum rate of roadway superelevation (e) for rural roads with no curb and gutter of 0.08. The maximum rate of superelevation for urban streets with curb and gutter is 0.06, with 0.04 being desirable.

SUPERELEVATION TABLE			
Design Speed	Maximum e	Minimum Radius ft.	Max. Deg. of Curve.
30	0.04	302	19 00′
40	0.04	573	10 00′
50	0.04	955	6 00′
60	0.04	1,528	3 45′
30	0.06	273	21 00′
40	0.06	509	11 15′
50	0.06	849	6 45′
60	0.06	1,380	4 15′
30	0.08	252	22 45′
40	0.08	468	12 15′
50	0.08	764	7 30′
60	0.08	1,206	4 45′

e = rate of roadway superelevation, foot per foot

D. Intersections

1. Streets shall be laid out so as to intersect as nearly as possible at right angles, and no street should intersect any other street at an angle less than sixty-five (65) degrees.

2. Property lines at intersections should be set so that the distance from the edge of pavement, of the street turnout, to the property line will be at least as great as the distance from the edge of pavement to the property line along the intersecting streets. This property line can be established as a radius or as a sight triangle. Greater offsets from the edge of pavement to the property lines will be required, if necessary, to provide sight distance for the stopped vehicle on the side street.

3. Off-set intersections are to be avoided. Intersections which cannot be aligned should be separated by a minimum length of 200 feet between survey centerlines.

E. Cul-de-sacs

Cul-de-sacs shall not be more than five hundred (500) feet in length. the distance from the edge of pavement on the vehicular turnaround to the right-of-way line should not be less than the distance from the edge of pavement to right-of-way line on the street approaching the turnaround. Cul-de-sacs should not be used to avoid connection with an existing street or to avoid the extension of an important street.

F. Alleys

1. Alleys shall be required to serve lots used for commercial and industrial purposes except that this requirement may be waived where other definite and assured provision is make for service access. Alleys shall not be provided in residential subdivisions unless necessitated by unusual circumstances.

2. The width of an alley shall be at least twenty (20) feet.

3. Deadend alleys shall be avoided where possible, but if unavoidable, shall be provided with adequate turnaround facilities at the deadend as may be required by the Planning Board.

G. Permits For Connection To State Roads

An approved permit is required for connection to any existing state system road. This permit is required prior to any construction on the street or road. The application is available at the office of the District Engineer of the Division of Highways.

H. Offsets To Utility Poles

Poles for overhead utilities should be located clear of roadway shoulders, preferably a minimum of at least 30 feet from the edge of pavement. On streets with curb and gutter, utility poles shall be set back a minimum distance of 6 feet from the face of curb.

I. Wheel Chair Ramps

All street curbs being constructed or reconstructed for maintenance purposes, traffic operations, repairs, correction of utilities, or altered for any reason, shall provide wheelchair ramps for the physically handicapped at intersections where both curb and gutter and sidewalks are provided and at other major points of pedestrian flow.

J. Horizontal Width on Bridge Deck

1. The clear roadway widths for new and reconstructed bridges serving 2 lane, 2 way traffic should be as follows:

   a. Shoulder section approach

      i. Under 800 ADT design year

         Minimum 28 feet width face to face of parapets of rails or pavement width plus 10 feet, whichever is greater.

      ii. 800 - 2000 ADT design year

         Minimum 34 feet width face to face of parapets of rails or pavement width plus 12 feet, whichever is greater.

      iii. Over 2000 ADT design year

         Minimum width of 40 feet, desirable width of 44 feet width face to face of parapets or rails.

   b. Curbs and gutter approach

      i. Under 800 ADT design year

         Minimum 24 feet face to face of curbs.

      ii. Over 800 ADT design year

         Width of approach pavement measured face to face of curbs.

         Where curb and gutter sections are used on roadway approaches, curbs on bridges shall match the curbs on approaches in height, in width of face to face of curbs, and in crown drop. The distance from face of curb to face of parapet or rail shall be 1'6" minimum, or greater if sidewalks are required.

2. The clear roadway widths for new and reconstructed bridges having 4 or more lanes serving undivided two-way traffic should be as follows:

   a. Shoulder section approach - Width of approach pavement plus width of usable shoulders on the approach left and right. (Shoulder width 8' minimum, 10' desirable.)

   b. Curb and gutter approach - Width of approach pavement measured face to face of curbs.

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